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3GPP LTE TDD Solution

MS2690A/MS2691A/MS2692A/MS2830A Signal Analyzer

MX269022A LTE TDD Downlink Measurement Software MX269023A LTE TDD Uplink Measurement Software MX269910A LTE TDD IQproducer MS2690A/MS2691A/MS2692A Signal Analyzer MS2830A Signal Analyzer

3GPP LTE TDD Solution

MX269022A LTE TDD Downlink Measurement Software NEW MX269022A-001 LTE-Advanced TDD Downlink Measurement Software MX269023A LTE TDD Uplink Measurement Software MX269910A LTE TDD IQproducer NEW MX269910A-001 LTE-Advanced TDD Option



MS2830A

Ve

Version 4.00

ANRITSU CORPORATION

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Slide 1



LTE TDD Measurement Solution

3GPP LTE Transmitter Measurement

MX269022A LTE TDD Downlink Measurement Software NEW MX269022A-001 LTE-Advanced TDD Downlink Measurement Software MX269023A LTE TDD Uplink Measurement Software

Test Model	2 110 000 000 Hz	Input Leve	1 -10.00 dBr				Trace Mode		ier Freq.	1 920 000 0	00 Hz	Input Le		-10.00 c	dBm	Trigger			E
	E-TM3.1		10 dB				_	Mod	ulation		AUTO			10 c	зB	Delay			0.
Channel Bandwidth	20MHz						EVM vs Subca	rrier Cha	nnel Bandwid	th	6MHz					Target Cl			F
Result		asuring						Res				leasuring							÷
MKR	0										_	and the later of t						/Max	
Subcerrier 1			Frequency Error		0.43	Hz	EVM vs Sym	MK	R	(2		Frequ	ency Erro	or		-0,	50 Hz	
Symbol 3					0.000		ETM VS Oyli	Subc	anier				Outou	t Power			-14.3	0 ppm 0 dBm	
Physical Channel			Output Power		-13.99			_					Mean	Power				21 dBm	
POSCH			Mean Power EVM(rms)		-13.99		Spectral Flats	Syrrd	ol Number				EVM(r EVM(p	ms)				57 % 98 %	
1.08299			EVM(rms) EVM(peak)		2.99		opectrairiat	5003	28				i c	emod-Sy	ymbol N	lumber	2	37	
0.45961			Symbol Numb	er		92			-0.14321					ymbol N				54	
a			Subcarrier Nu			86	Power vs B		-1.08030					rame Nu Offset	mber			0 01 dB	
			Frame Numbe Origin Offset	e	-53.13	0	Power vs H	28					Time (Offset				.9 ms	
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EVM vs Subcarrier									ne O 🕒										
Mic D /D III	S/Peak) Subcarrier	1	EVM		64 % / 1.71	*	EVM vs RE	EVM	l ve Subcerrie R(RMS/Peak)		0	EVM		0.48	/ 0	05.90			
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*2.02								MKF											
92.00							Summary	MKF											
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+2.00 7.50 5.00								4	1600 -										
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1000 1000 500 200 Frame 0 Ref.Eat Pro A ICSG024 ETE=TI Rest.Rt End Coater Freg.Mts) Status Status Status	Ap-Ng ruh (n)	ich / far uit,	00	10 500	rerage & Max	,	Test Mode Summary 3/14/2013 1 3/14/2013 1 3/14/2013 1 3/14/2013 1 3/14/2013 1 3/14/2013 1 3/14/2013 1	A Fran Color Ref.	1600	30	60	90 T	Qury (hords) 10 3	Nr	50 30	· · · · ·		0 mu ^{re} (n. 1	
Frame 0 Frame 0 Ref Ext Pro Ref Ext Pro Ref Ext Pro Status Site are O (See a)	49 okultuket arfunda 100 200 3 DD Downlink	ich / far uit,	900 250	10 500	rerage & Max	,	Test Mode Summary 3/14/2013 1 3/14/2013 1 3/14/2013 1 3/14/2013 1 3/14/2013 1 3/14/2013 1 3/14/2013 1	A Fran Color Ref.	1600	30	60	90 T	V/n_/w/i 0 :	Nr.w.A.J S0 10		· · · · ·		10-100 ⁰⁰ /h) 28	
Frame 0 State Presses Result Result Result Storage Guart Storage Guart Storage Guart Storage Guart Storage Guart Storage Guart Storage Guart Storage Guart	Aguid print with print and a starting office of the starting existing office Correct DD Downlink Pt 11000 18/18	znh/fårt uti, 13 ou tition On 73 st	0 10/10	A1	/erage & Max 50 100/10	10 / 10	Test Mode Summary 3/14/2013 1 3/14/2013 1 3/14/14 3/14	A Fran Color Ref.	1600	30	60	90 T	0 :	80 TI		· · · · ·		n - 1 - 22	
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France of France of Control of Co	44 - d ariant an ann ann an an ann an an ann an an an	ent/fac us, a est tion On 0.74 0.44 -18.54	00 10/10 0.17/ 0.17/ 0.17/ 0.17/ 0.17/ 0.17/	0.36 0.36 0.36 0.36 0.43	rerage & Max 90 10/10 10/10 10/10 0/10 0/10 10/10 10/10 10/10	10 / 10 0.45 0.73 15.43	Test Mode Summary 3/14/2013 1 3/14/2013 1 3/14/14 3/14	A Fran Color Ref.	1600	30	60	90 T	With John 0	1 90 10	10	· · · · ·		11 20 10 20	
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The MX269022A/23A support measurement of RF Tx characteristics of 3GPP LTE (Long Term Evolution) downlink (TDD) and uplink (TDD) signals.

The MX269022A-001 is an option for the MX269022A to measure the RF Tx characteristics of LTE-Advanced downlink (TDD) signals. (Requires MX269022A)

MS269xA/MS2830A Signal Analyzer series supports various transmission evaluations, including modulation analysis.

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LTE TDD Measurement Solution

3GPP LTE TDD Receiver Measurement

MS269xA/MS2830A for Vector Signal Generator Option MX269910A LTE TDD IQproducer[™] MX269910A-001 LTE-Advanced TDD Option

6 B	M 🖻			<u>بر</u>	MI P		X Norm	el Setup
System .	LTE			Test Type	*	BS Test/F	RC(UL)	
FRO(UL)	A1-1	Bandwidth	5MHz	Cell ID		l Off 0	Ta Filter	Ideal
Uplinic-downli Configuration	4 0	Special S Configura	àframe ion	0				
Start Number	0	nFINTI	0	hex 1	Vodulation	QPSK	L	IL-SCH
DMRS for PUS	сн							
Group Hopping	Off Seq Hop	ping 0	ff Delta	90 O	n(1)_D8	/RS0	n(2)_DMRS	0
Pattern Settin	ı							
	LTE_TDD							
Package								

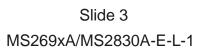


The MX269910A LTE TDD IQproducer is PC application software with a GUI for generating waveform patterns in compliance with the LTE TDD specifications in the 3GPP TS 36.211, TS 36.212, and TS 36.213 standards.

The generated waveform patterns can be output from the Vector Signal Generator option for MS269xA/MS2830A.

Installing the MX269910A-001 LTE-Advanced TDD option supports output of signals in compliance with the LTE-Advanced TDD standards. (Requires MX269910A)

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MX269022A Downlink LTE TDD Downlink Measurement Software

MX269023A Uplink LTE TDD Uplink Measurement Software

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Slide 4 MS269xA/MS2830A-E-L-1



Measurement Functions (1/3)

Text Display

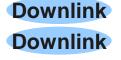
-Frequency Error

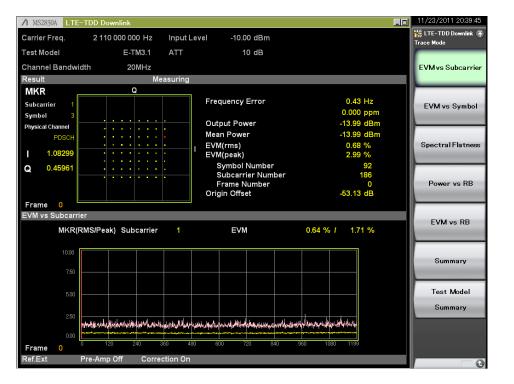
- -Output Power
- -EVM (Peak/rms)
- -Origin Offset
- -Timing Offset (External Trigger)
- Constellation Display
- -Constellation

• Graphical Display

-EVM vs Subcarrier

- -EVM vs Symbol
- -Spectral Flatness
- -Power vs Resource Block
- -EVM vs Resource Block





-Time Based EVMUplink-EVM vs Demod-SymbolUplink-In-Band EmissionUplink

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Slide 5 MS269xA/MS2830A-E-L-1

Measurement Functions (2/3)

Summary Display

When the Trace Mode is set to Summary, this displays the numeric results on the multiple pages at the bottom of the screen.

• Test Model Summary Display Downlink

When the Trace Mode is set to Test Model Summary, this displays the numeric results on the multiple pages at the bottom of the screen. The pages are switched using Page Number.

MIMO Display Downlink

At MIMO Summary measurements for Tx Diversity and MIMO signals, the mixed signal from multiple antennas is input and the time difference between each antenna is measured.

Test Model Summary

MS2830A LTE-TDD Uplink	(11/24/2011 1858:17	▲ MS2830A LTE-T	DD Downlink				11/26/2011 20:25
arrier Freq. 1 920 00	00 000 Hz Input Le	vel -10.00 dBm	Trigger	External	👯 LTE-TDD Uplink 🕋 Trace Mode	Carrier Freq.	2 110 000 000 Hz	Input Level -20.00	dBm		Reference Signal
lodulation	AUTO ATT	10 dB	Delay	0.000 µs		Modulation	AUTO A	ATT 4	dB		
Channel Bandwidth	5MHz		Target Ch	PUSCH	EVM vs Subcarrier	Channel Bandwidt	h 20MHz		Reference S	ignal Auto	
Result	Measuring					Result					
PUSCH EVM (rms) QPSK 0.56 16QAM 444 44	% %	Frequency Error Output Power		/Max frame -0.61 Hz /0 0.000 ppm /0 -13.79 dBm /0	EVM vs Symbol		Tx0/Rx	Tx1/Rx	Tx2/Rx	Tx3/Rx	
64QAM ****.** PUSCH EVM (peak)	%	Mean Power		-13.80 dBm /0			(Reference)				
Demod-Symbol/Sym QPSK 2.21		EVM(rms) EVM(peak)		0.56 % / 0 2.21 %	Time Based EVM	RS Power RS EVM (rms)	0.00 dB 0.59 %		***.** dB	***.** dB	
16QAM ****.**	% **** **** ****	Demod-Symbo		280		RS EVM (rms) RS Timing Offs			. 78 ****.* ns	. /o	
64QAM ****.** DMRS EVM (rms) 0.56		Symbol Numbe Frame Number Origin Offset		32 0 -54.37 dB /0	EVM vs	RS Freq	0.00 Hz	*****.** Hz	****.** Hz	****.** Hz	Cell ID
OMRS EVM (peak) / Subcarri		Time Offset		-54.37 dB /0 -9.9 ns	Demod-Symbol						1
											Power Boost
Summary	_	_	Pa	ge No. 1 / 16	Spectral Flatness						0.000dB
			emod-Symbol <i>l</i>	Symbol / Frame							
Total EVM (time based)	EVM Final rms peak EVM High rms	0.56 % 2.21 % 0.56 % 1.99 %	280 / 32		In-Band Emission						Number of Antenna Por 1 2
	EVM Low rms peak	1.99 % 0.56 % 2.21 %	228 / 12 280 / 32		<u> </u>						Antenna Po
PUSCH QPSK EVM (time based)	EVM Final rms peak EVM High rms	0.56 % 2.21 % 0.56 %	280 / 32		Summary						Antenna Po 0
	peak EVM Low rms	0.56 % 1.99 % 0.56 % 2.21 %	228 / 12 280 / 32			lide					
	peak	2.21 %	280 7 32	2 7 0							
Ref.Ext Pre-Amp Of	f Correction On				0	S20007-L-	re-Amp Off				

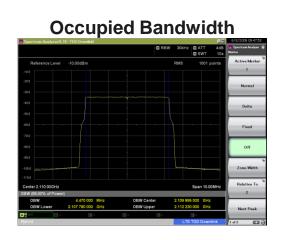
MIMO Summary

Measurement Functions (3/3)

Spectrum Analyzer(LTE-TDD Downlink)					.im 6/8/2009	09.47.00
		RBW	30kHz	C ATT	4dB 10s Marker	Analyzer -
Reference Level -10.00dBm		ş	RMS	1001 p	Active	Marker
					1	-
					Nor	and loss
					Nor	
-40.0		-η			Del	
		1			Der	ta
40.0						
-70.0					Fix	bd
40.0						
					O	ff
						_
100.0					Zona	Nidth
					Relati	To To
Center 2.110 00GHz Channel Power				Span 10.0	OMHz 2	10
Channel Center 2.110 000 000 GH	Absolute Power		dBm /			-
Channel Width 5.000 000 MH		-12.91		5.000MHz	Next	Peak

Adjacent Channel Leakage Power *2





Spectrum Emission Mask *3

Spectrum Anal		ownlink)					6/8/2009 09:50:31
							🔛 Spectrum Analyzer 🗿 Trace
Reference I	Level 30.00	iBm[40.00dB]		ABS1	ABS2	REL	Active Trace
					Measuring.		^
20.0			minumitiand				Trace Type
0.0							Write
-10.0							
							Storage Mode
			†				Max Hold
			t t				Storage Count
-50.0	and the set of the second s	الهاددية ورجايتها فا		application and	a h the public sector of the	in the state of th	10
-60.0							-
Center 2.110 00						Span 25,10MHz	
Spectrum Emiss						open zo, tumnz	
	Off	set	L	ower	U	pper	1
Result	Start (MHz)	Stop (MHz)	Peak (dBm)	Freq (MHz)	Peak (dBm)	Freq (MHz)	
	2.550 000	7.550 000	-18.68 -47.19	2 107.425 000 2 099.535 000	-15.55	2 112.570 000 2 120.520 000	
Reference	3.515 000	4.000 000		2 099,000 000		2 120.020 000	
32.91 dBm							
32.91 GBM							Detection
	12.500 000	15.000 000					
AWMax 10 / 10	B -		0-	8-		-6	Pos & Neg
					LTE	TDD Downlink	

Kind of Template:

- Channel Power UL/DL

- Mean Power / Filtered Power

- 1.4 / 3 / 5 / 10 / 15 / 20MHz BW

- OBW

UL/DL

- 1.4 / 3 / 5 / 10 / 15 / 20MHz BW

- ACLR

UL/DL

- UTRA / E-UTRA

- 1.4 / 3 / 5 / 10 / 15 / 20MHz BW

- SEM

DL

- Category A / Category B

- < 1GHz / > 1GHz

- 1.4 / 3 / 5 / 10 / 15 / 20MHz BW

UL

- General, NS-03, NS-04, NS-06/07

*1: Requires Channel Power template for Mean Power or Filtered Power selecting
*2: Requires ACLR template for E-UTRA or UTRA selecting
*3: Requires SEM template for

initial parameter setting

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Slide 7 MS269xA/MS2830A-E-L-1

Measurement Functions/ Text Display (Frequency Error, Tx Power, EVM)

Displays (text) all active subcarrier Frequency Error, Output Power, EVM (rms, peak) values in user-specified subframes (50 max.). Choosing Average & Max displays average and maximum values on same screen. This is useful for evaluating DUT dispersion.

Measurement Results (text)

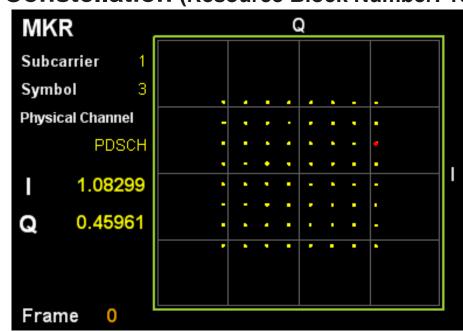
Frequency Error	1.10 Hz
	0.001 ppm
Output Power	-13.98 dBm
Mean Power	-13.99 dBm
EVM(rms)	0.68 %
EVM(peak)	2.78 %
Symbol Number	83
Subcarrier Number	100
Frame Number	0
Origin Offset	-53.21 dB
Time Offset	0.0 ns

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Slide 8 MS269xA/MS2830A-E-L-1

Measurement Functions/ Constellation Display (Constellation)

Displays Constellation for all active subcarriers in user-specified symbol or in user-specified resource block (RB). Analyzes QPSK/16QAM/64QAM.



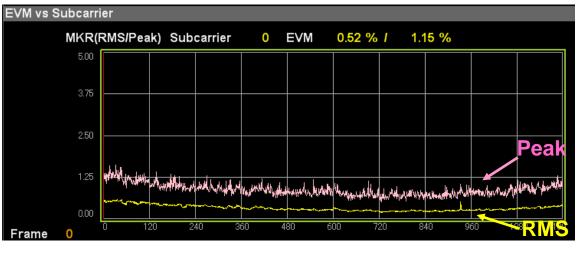
Constellation (Resource Block Number: 10)

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Slide 9 MS269xA/MS2830A-E-L-1

Measurement Functions/ Graph Display (EVM vs Subcarrier)

Displays EVM graph per subcarrier targeting user-specified symbol or user-specified subframes (50 max). Displays Peak and Average (rms) on same screen. This enables measurement of instantaneous EVM.



EVM vs Subcarrier

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Slide 10 MS269xA/MS2830A-E-L-1

Measurement Functions/ Graph Display (EVM vs Symbol)

Displays EVM graph per symbol targeting user-specified symbol or user-specified subframes.

Displays Peak and Average (rms) on same screen. This enables measurement of instantaneous EVM.



EVM vs Symbol

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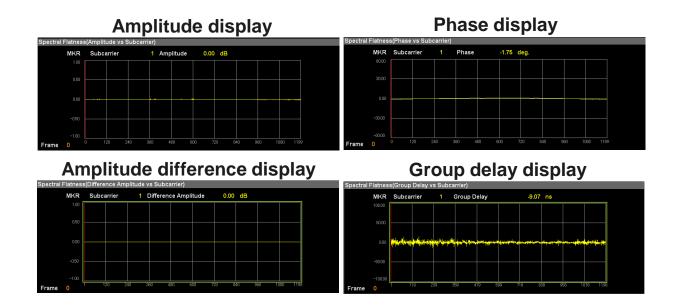
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Slide 11

Measurement Functions/ Graph Display (Spectral Flatness)

Displays amplitude/phase/group delay graph in user-specified subframes.

Detects OFDM-specific problems such as symbol timing error between subcarriers.



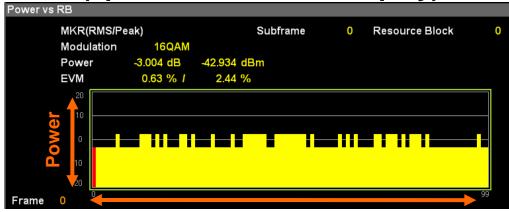
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Slide 12 MS269xA/MS2830A-E-L-1 /inritsu

Measurement Functions/ Graph Display (1/2) (Power vs Resource Block)

Observes power distribution of each resource block of specified subframe. Checks power boosting at each resource block.

Power vs RB (specified subframe display)



Resource Block

*RB time axis in subframe units

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Slide 13

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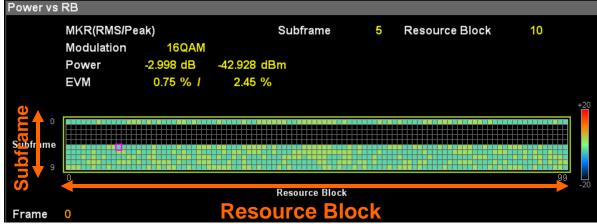
Downlink

Measurement Functions/ Graph Display (2/2) (Power vs Resource Block)

Displays power of each resource block of specified subframe segments as graph.

The power distribution of each resource block can be seen instantly.

Power vs RB (whole display)



*RB time axis in subframe units

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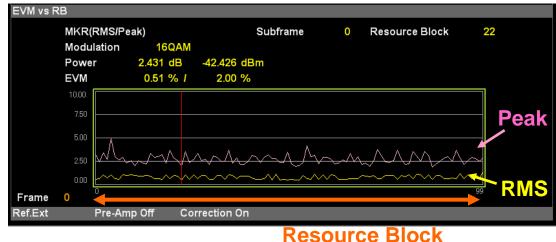
Slide 14

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Downlink

Measurement Functions/ Graph Display (EVM vs Resource Block)

Displays EVM distribution for each resource block of specified subframe segments as graph. Identify EVM deterioration with resource block.



EVM vs RB

*RB time axis in subframe units

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Slide 15

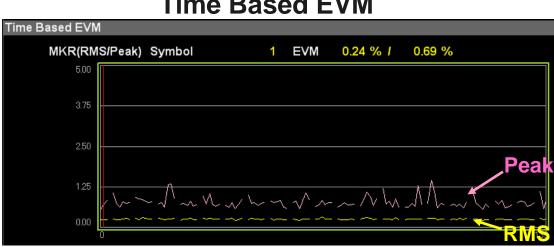
/inritsu

Downlink

Measurement Functions/ Graph Display (Time Based EVM)



Displays PUSCH EVM of each symbol for all subcarriers as graph to observe temporal change in PUSCH EVM.



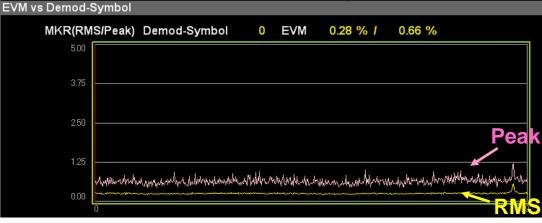
Time Based EVM

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Slide 16

Measurement Functions/ Graph Display (EVM vs Demod-Symbol)

Displays PUSCH EVM of demodulated symbol for up to 50 subframes for specified symbols or specified segments as graph.



EVM vs Demod-Symbol

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Uplink

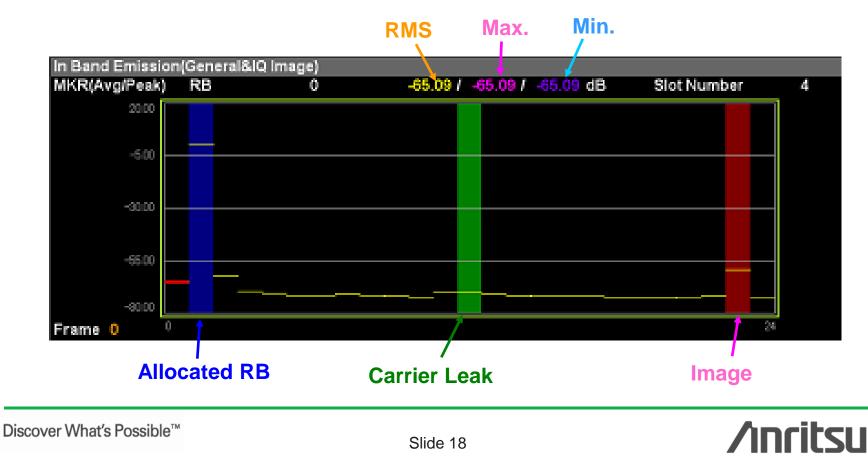
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Slide 17

Measurement Functions/ Graph Display (In-band Emissions)

Uplink

Measures in-band emissions per resource block at each Tx band spurious, carrier leak and image. Easy-to-understand display of in-band spurious.



Measurement Functions/Summary Display (1/2)

Downlink

- > EVM/Power of Each Channel
- Total EVM
- > PDSCH (ALL/QPSK/16QAM/64QAM) EVM
- > PDCCH EVM
- RS/P-SS/S-SS EVM
- > PBCH/PCFICH/PHICH EVM
- Power vs Slot
- > Cell ID
- Number of PDCCH Symbols
- RS power vs Subframe
- > OFDM Symbol Tx Power vs Subframe
- > RS/P-SS/S-SS/PBCH/PDCCH/ PCFICH/PHICH Power

MS2830A LTE-T	DD Downlink				11/26/2011 19:5
arrier Freq.	2 110 000 000 Hz	Input Level	-20.00 dBm		Trace Mode
est Model	E-TM3.3	ATT	4 dB		
hannel Bandwidtl	ו 20MHz				EVM vs Subcar
lesult	М	easuring			
Frequency Err	or	-48.90 Hz	Symbol Clock I	Fror	
Trequency Lin	51	-0.023 ppm	Symbol Clock I	-0.040 ppm	EVM vs Sym
Output Power		-21.66 dBm		ere re ppm	<u> </u>
Mean Power		-21.66 dBm			
Origin Offset		-53.88 dB			Spectral Flatr
ummary				Page No. 1 / 16	Power vs R
	Avg. E	VM(rms)	Avg. EVM(peak)	Avg. Power	
Total	0.6	5 %	3.43 %		
PDSCH	0.8	2 %	5.81 %		EVM vs RE
RS	0.5	9 %	2.16 %	-52.443 dBm	
P-SS	0.7	6 %	1.71 %	2.431 dB	
S-SS	1.1	7 %	2.05 %	2.427 dB	Summary
PBCH		0 %	2.06 %	2.425 dB	
PCFICH		6 %	1.45 %	0.007 dB	Test Mode
PHICH		9%	1.40 %	-0.004 dB	Summary
		9%	1.81 %		·
PDCCH			1.81 %	1.195 dB	
	mbol Tx Power (Ave	rage)		-21.612 dBm	
lef.Int Pr	e-Amp Off				
ummary	_				
RS Powe	r	-52.458 dB	m	Page No. 15 / 16	Storage
P-SS Pov		-50.028 dB		2.430 dB	
S-SS Pov		-50.029 dB		2.429 dB	
PBCH Po		-50.035 dB		2.423 dB	
PDCCHF		-51.265 dB		1.192 dB	
PCFICH F		-51.265 dB		0.003 dB	
	oup Power	-52.454 dB		-0.007 dB	
There di		-02.400 UB			
Cell ID				1	
Number o	of PDCCH Symbols (Subframe 1 and	6)	1	D
				1	Page Numbe
Number of	of PDCCH Symbols (Other Subframe	5		15



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Slide 19 MS269xA/MS2830A-E-L-1

Measurement Functions/Summary Display (2/2)

Uplink

- > PUSCH EVM(rms)/(peak)
- DMRS EVM(rms)/(peak)
- Frequency Error
- > Output Power, Mean Power
- EVM(rms)/(peak)
- Origin Offset
- Time Offset
- > Total EVM (Time Based)
- > PUSCH QPSK/16QAM/64QAM EVM (Time Based)
- > Total EVM (Frequency Based)
- > PUSCH ALL/QPSK/16QAM/64QAM EVM
- > DMRS EVM
- Frequency Error vs Slot
- > Origin Offset vs Slot
- In-Band Emission
- Inside/Outside Flatness
- > EVM equalizer spectrum flatness

✓ MS2830A LTE-TE	DD Uplink							11/24/2011 18:58:1
Carrier Freq.	1 920 000 000	0 Hz Input	Level	-10.00 dBm	Trigger		External	🚟 LTE-TDD Uplink (Trace Mode
Modulation	A	UTO ATT		10 dB	Delay		0.000 µs	
Channel Bandwidth	n 51	MHz			Target Ch		PUSCH	EVM vs Subcarrie
Result		Measuri	ng					
PUSCH EVM (rms) QPSK 160AM 640AM PUSCH EVM (peak) Demod-Syr QPSK 160AM 640AM DMRS EVM (rms)	0.56 % *** ** % hool/Symbol/F 2.21 % *** ** % *** ** %	Frame 280 32 **** **** *	Outp Mear EVM	uency Error ut Power (ms) (peak) Demod-Symbol Symbol Number Frame Number o Offset	r	-0.61 Hz 0.000 ppm -13.79 dBm -13.80 dBm 0.56 % 2.21 % 280 32 0 -54.37 dB	/0	EVM vs Symbol Time Based EVM EVM vs
DMRS EVM (peak) /	Subcarrier/Sy	ymbol/Frame 270 / 129 /	Time	Offset		-9.9 ns	70	Demod-Symbol
DMRS EVM (peak) / Summary	Subcarrier/Sy	ymbol/Frame 270 / 129 /	Time		Pa			Demod-Symbol Spectral Flatnes
	Subcarrier/Sy 1.32 % E E	vmbol/Frame 270 / 129 / VM Final rms pea VM High rms pea VM Low rms pea	Time 0 k k	Offset		-9.9 ns age No. 1 / / Symbol / Fra 32 / 0 21 / 0	/ 16	
Summary Total EVM	I Subcarrier/Sy 1.32 % E E E E E E E E E E E E E E	270 / 129 / EVM Final rms pea EVM High rms pea tym Ligh rms pea	Time 0 K K K K	Offset EVM / De 0.56 % 0.56 % 1.99 % 0.56 %	mod-Symbol 280 / 3 228 / 1	-9.9 ns / Symbol / Fra 22 / 0 21 / 0 32 / 0 32 / 0 32 / 0 21 / 0 21 / 0	/ 16	Spectral Flatnes

		Page No.	6 / 16
requency Error v			
Max : -48.13	Hz / 17 Slot		
Slot 4	-39.25 Slot 18	-44.04 Slot 36	-39.91
Slot 5	-45.53 Slot 19	-43.91 Slot 37	-45.41
Slot 6	-42.16 Slot 24	-44.04 Slot 38	-43.90
Slot 7	-45.31 Slot 25	-42.49 Slot 39	-41.68 Analysis
Slot 8	-43.62 Slot 26	-43.31 Slot 44	-42.89
Slot 9	-40.73 Slot 27	-38.83 Slot 45	-44.08
Slot 14	-41.95 Slot 28	-41.30 Slot 46	-39.75 OFrame
Slot 15	-45.29 Slot 29	-42.64 Slot 47	-41.37
Slot 16	-38.78 Slot 34	-42.47 Slot 48	-38.25
Slot 17	-48.13 Slot 35	-42.09 Slot 49	-43.58
Jnit : Hz			

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MS269xA/MS2830A-E-L-1

Slide 20

Measurement Functions/Test Model Summary

Downlink

- > Frame Type and RS boosting of each Subframe
- EPRE/Ers for each Subframe
 P-SS, S-SS, PBCH, PCFICH,
 PHICH group, PDCCH REG
- > PDSCH EPRE/Ers QPSK/16QAM/64QAM
- > EVM for ame1 and frame2 of TM1.2, 2.3, 3.3
- Power vs Slot for frame1 and frame2 of TM1.2, 2.3, 3.3
- RS Power for frame1 and frame2 of TM1.2, 2.3, 3.3
- > OSTP for frame1 and frame2 of TM1.2, 2.3, 3.3

arrier Freq.	2 110 000	k 000 H 7	Input Level	-20.00 dBm					👹 LTE-TDD Downlink
			Input Level						Trace Mode
est Model		-TM3.3	ATT	4 dB					
hannel Bandwid	dth	20MHz							EVM vs Subcarri
esult		Mea	suring						
Frequency Erro		40	35 Hz	Output Power		21.6	8 dBm		
	,		23 ppm	Output Fower		-21.0			EVM vs Symbo
EVM(rms)			66 %	Mean Power		-21.6	8 dBm		<u> </u>
EVM(peak)		3.	27 %						
est Model Sumn	nary								Spectral Flatnes
					P	age No.	1 /	10	
	From	Turne and	BS becating of	f each Subframe					Power vs RB
			Test Model						
	Subfr	ame	Frame Type	RS boosting					
	0		Frame2		1.000				EVM vs RB
	1		****		*** ***				
	3		****		*** ***				
	4		Frame2		1.000				Summary
	5 6		Frame2 Frame2		1.000				
	7		Frame2		1.000				Test Model
	8		Frame2 Frame2		1.000 1.000				rest wouer
									Summary
									Summary
	Pre-Amp Off								
lef.int	Pre-Amp Off				P	age No.	7 /	10	
est Model Summ	Pre-Amp Off	e2 of TM1.2	,2,3.2,3.3		P	age No.	7 /	10	
est Model Summ	Pre-Amp Off nary	Frame 1			Frame	2		10	Scale
est Model Summ	Pre-Amp Off nary ne1 and frame Avg EVM	Frame 1 Max		Avg EVM	Frame : Max B		ak)	10	
est Model Sumn EVM for fran Channel	Pre-Amp Off nary ne1 and framo Avg EVM (rms)	Frame 1 Max EVM / Symb	EVM (peak) Subcarrier / ol / Frame	(rms)	Frame Max B EVM / Symbo	2 EVM (pea	ak) er <i>l</i>	10	Scale
est Model Sumn EVM for fran Channel Total	Pre-Amp Off nary ne1 and fram Avg EVM (rms) 0.65 %	Frame 1 Max EVM / Symb 2.95 %	EVM (peak) Subcarrier / ol / Frame 659 134	(rms) 0 ****.** %	Frame Max E EVM / Symbo	2 EVM (pea Subcarri ol / Fram	ak) er/ e	10	Scale
EVM for fran EVM for fran Channel Total PDSCH	Pre-Amp Off nary ne1 and frame Avg EVM (rms) 0.65 % 0.84 %	Frame 1 Max EVM / Symb 2.95 % 4.72 %	EVM (peak) Subcarrier / ol / Frame 659 134 144 134	(rms) 0 ***.** % 0 ***.** %	Frame : Max I EVM / Symbo	2 EVM (pea Subcarr	ak) er <i>l</i>	10	Scale
EVM for fram EVM for fram Channel Total PDSCH RS	Pre-Amp Off nary ne1 and fram Avg EVM (rms) 0.65 % 0.84 % 0.58 %	Frame 1 Max EVM / Symb 2.95 % 4.72 % 2.44 %	EVM (peak) Subcarrier / ol / Frame 659 134 144 134 1093 77	(rms) 0 ****.** % 0 ****.** % 0 ****.** %	Frame : Max E EVM / Symbol *** ** % *** ** %	2 EVM (pea Subcarri ol / Fram	ak) er/ e	10	Scale
EVM for fran EVM for fran Channel Total PDSCH RS P-SS	Pre-Amp Off nary ne1 and frame Avg EVM (rms) 0.65 % 0.84 % 0.88 % 0.88 %	Frame 1 Max EVM / Symb 2.95 % 4.72 % 2.44 % 1.48 %	EVM (peak) Subcarrier / ol / Frame 659 134 144 134 1093 77 572 86	(rms) 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** %	Frame Max P EVM / Symbol *** * % *** ** %	2 EVM (pea Subcarri ol / Fram	ak) er/ e	10	Scale
EVM for fram Channel Total PDSCH RS P-SS S-SS	Pre-Amp Off nary Avg EVM (rms) 0.65 % 0.84 % 0.58 % 0.83 % 0.95 %	Frame 1 Max E∨M / Symb 2.95 % 4.72 % 2.44 % 1.48 % 2.02 %	EVM (peak) Subcarrier / ol / Frame 659 134 144 134 1093 77 572 86 580 83	(rms) 0 *** ** % 0 *** ** % 0 *** ** % 0 *** ** %	Frame : Max k EVM / Symbo *** ** % *** ** %	2 EVM (pea Subcarri ol / Fram	ak) er/ e	10	Scale
EVM for fram Channel Total PDSCH RS P-SS S-SS PBCH	Pre-Amp Off nary ne1 and frame Avg EVM (rms) 0.65 % 0.83 % 0.83 % 0.95 % 0.84 %	Frame 1 Max EVM // 2.95 % 4.72 % 2.44 % 1.48 % 2.02 % 2.94 %	EVM (peak) Subcarrier / ol / Frame 659 134 144 134 1093 77 572 86 580 83 577 9	(rms) 0 *** ** % 0 *** ** % 0 *** ** % 0 *** ** % 0 *** ** % 0 *** ** % 0 *** ** %	Frame : Max f EVM / Symbo 445.24 % 445.24 % 445.24 % 445.24 %	2 EVM (pea Subcarr ol / Fram	ak) er / e ***	10	Scale
EVM for fran Channel Total PDSCH RS P-SS S-SS PBCH PCFICH	Pre-Amp Off nary Avg EVM (rms) 0.65 % 0.84 % 0.58 % 0.83 % 0.95 % 0.84 % 0.51 %	Frame 1 Max EVM // Symb 2.95 % 4.72 % 2.44 % 2.02 % 2.44 % 1.48 % 1.48 % 1.04 %	EVM (peak) Subcarrier / ol / Frame 659 134 144 134 1093 77 572 86 580 83 577 9 609 126	(rms) 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** %	Frame : Max f EVM / Symbo 445.44 % 445.44 % 445.44 % 445.44 %	2 EVM (pes Subcarri ol / Fram **** **** ****	ak) er / *** *** ***	10	Scale
EVM for fran Channel Total PDSCH RS P-SS S-SS PBCH PCFICH PHICH	Pre-Amp Off nary Avg EVM ((ms) 0.65 % 0.84 % 0.83 % 0.95 % 0.83 % 0.95 % 0.84 % 0.95 % 0.84 % 0.95 %	Frame 1 Max EVMJ 2.95 4.72 % 2.44 % 2.02 % 2.44 % 1.48 % 1.48 % 1.48 % 1.48 % 1.48 % 1.27	EVM (peak) Subcarrier / ol / Frame 659 134 144 134 1093 77 572 86 580 83 577 9 609 126 15 84	(rms) 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** %	Frame Max I EVM J Symbol **** ** %	2 EVM (pes Subcarri ol / Fram **** **** ****	ak) er / *** *** ***		Scale
EVM for fran Channel Total PDSCH RS P-SS S-SS PBCH PCFICH PHICH PDCCH	Pre-Amp Off nary Avg EVM (rms) 0.65 % 0.84 % 0.58 % 0.83 % 0.95 % 0.84 % 0.51 %	Frame 1 Max EVM // Symb 2.95 % 4.72 % 2.44 % 2.02 % 2.44 % 1.48 % 1.48 % 1.04 %	EVM (peak) Subcarrier / ol / Frame 659 134 144 134 1093 77 572 86 580 83 577 9 609 126	(rms) 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** %	Frame : Max f EVM / Symbo 445.44 % 445.44 % 445.44 % 445.44 %	2 EVM (pes Subcarri ol / Fram **** **** ****	ak) e ann	10	Scale
EVM for fran Channel Total PDSCH RS P-SS S-SS PBCH PCFICH PHICH	Pre-Amp Off nary Avg EVM ((ms) 0.65 % 0.84 % 0.83 % 0.95 % 0.83 % 0.95 % 0.84 % 0.95 % 0.84 % 0.95 %	Frame 1 Max EVM 2.95 % 4.72 % 2.44 % 1.48 % 2.02 % 2.44 % 1.04 % 1.04 % 1.27 % 1.52 %	EVM (peak) Subcarrier / ol / Frame 659 134 144 134 1093 77 572 86 580 83 577 9 609 126 15 84	(rms) 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** %	Frame Max I EVM J Symbol **** ** %	2 EVM (pes Subcarri ol / Fram **** **** ****	ak) e ann		Scale
EVM for fran Channel Total PDSCH RS P-SS S-SS PBCH PCFICH PHICH PDCCH Number of	Pre-Amp Off nary Avg EVM ((ms) 0.65 % 0.84 % 0.83 % 0.95 % 0.83 % 0.95 % 0.84 % 0.95 % 0.84 % 0.95 %	Frame 1 Max EVM 3.95 % 4.72 % 2.44 % 1.48 % 2.02 % 2.44 % 1.04 % 1.04 % 1.27 % 1.52 %	EVM (peak) Subcarrier / ol / Frame 659 134 144 134 1093 77 572 86 580 83 577 9 609 126 15 84	(rms) 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** %	Frame Max I EVM J Symbol **** ** %	2 EVM (pes Subcarri ol / Fram **** **** ****	ak) e ann	10	Scale Storage
EVM for fram Channel Total PDSCH RS P-SS S-SS PBCH PCFICH PHICH PDCCH Number of subframe	Pre-Amp Off nary ne1 and frame Avg EVM (ms) 0.65 % 0.84 % 0.58 % 0.83 % 0.84 % 0.51 % 0.54 %	Frame 1 Max EVM 3.95 % 4.72 % 2.44 % 1.48 % 2.02 % 2.44 % 1.04 % 1.04 % 1.27 % 1.52 %	EVM (peak) Subcarrier / ol / Frame 659 134 144 134 1093 77 572 86 580 83 577 9 609 126 15 84	(rms) 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** %	Frame Max I EVM J Symbol **** ** %	2 EVM (pes Subcarri ol / Fram **** **** ****	ak) e ann	10	Scale
EVM for fram Channel Total PDSCH RS P-SS S-SS PBCH PCFICH PHICH PDCCH Number of subframe	Pre-Amp Off nary Avg EVM ((ms) 0.65 % 0.84 % 0.83 % 0.95 % 0.83 % 0.95 % 0.84 % 0.95 % 0.84 % 0.95 %	Frame 1 Max EVM 3.95 % 4.72 % 2.44 % 1.48 % 2.02 % 2.44 % 1.04 % 1.04 % 1.27 % 1.52 %	EVM (peak) Subcarrier / ol / Frame 659 134 144 134 1093 77 572 86 580 83 577 9 609 126 15 84	(rms) 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** %	Frame Max I EVM J Symbol **** ** %	2 EVM (pea Subcarri ol / Fram	ak) er / e ^^^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^	 <td>Scale Storage Page Number 7</td>	Scale Storage Page Number 7
EVM for fram Channel Total PDSCH RS P-SS S-SS PBCH PCFICH PHICH PDCCH Number of subframe	Pre-Amp Off nary ne1 and frame Avg EVM (ms) 0.65 % 0.84 % 0.58 % 0.83 % 0.84 % 0.51 % 0.54 %	Frame 1 Max EVM 3.95 % 4.72 % 2.44 % 1.48 % 2.02 % 2.44 % 1.04 % 1.04 % 1.27 % 1.52 %	EVM (peak) Subcarrier / ol / Frame 659 134 144 134 1093 77 572 86 580 83 577 9 609 126 15 84	(rms) 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** % 0 ***.** %	Frame Max I EVM J Symbol **** ** %	2 EVM (pea Subcarri ol / Fram	ak) er / e ^^^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^	 <td>Scale Storage</td>	Scale Storage

Downlink

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Measurement Functions/MIMO Summary

Downlink

At MIMO Summary measurements for Tx Diversity and MIMO signals, the mixed signal from multiple antennas is input and the time difference between each antenna is measured.

Downlink

> RS Power

The difference in the RS Power between the antenna signal specified at Antenna Port and the signal for each antenna specified at Number of Antenna Ports is displayed in dB units.

> RS EVM

This displays each RS EVM value for the number of antennas specified at Number of Antenna Ports.

RS Timing Offset

This displays the RS time difference between the antenna signal specified at Antenna Port and each of the number of antennas specified at Number of Antenna Ports.

RS Freq

This displays the frequency difference between the antenna signal specified at Antenna Port and each of the number of antennas specified at Number of Antenna Ports.

▲ MS2830A LTE-TDD D	Downlink			_0	11/26/2011 20:25:56
Carrier Freq. 21	10 000 000 Hz In	put Level -20.00	dBm		ETE-TDD Downlink 🖟
Modulation	AUTO AT	П 4	dB		Reference Signal
Channel Bandwidth	20MHz		Reference S	ignal Auto	
Result					
	Tx0 / Rx (Reference)	Tx1/Rx	Tx2/Rx	Tx3/Rx	
RS Power	0.00 dB	***.** dB	***.** dB	***.** dB	
RS EVM (rms)	0.59 %	*.** %	*.** %	*.** %	
RS Timing Offset	0.0 ns	****.* ns	****,* ns	****.* ns	
RS Freq	0.00 Hz	*****.** Hz	****.** Hz	****.** Hz	Cell ID
					1
					Power Boosting
					0.000dB
					Number of Antenna Ports
					Antenna Ports 1 2 4
					Antenna Port
					0
Ref.Int Pre-An	np Off				0

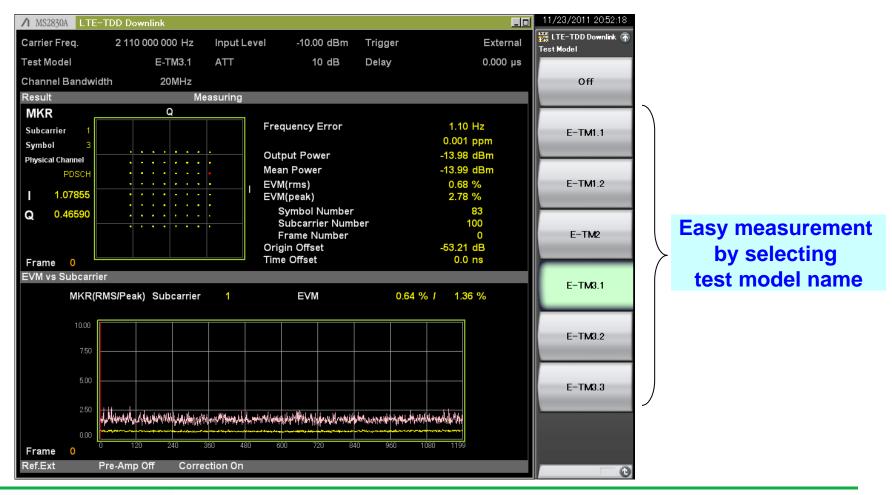


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Slide 22

Easy Measurement of Test Model Signals

Test model signals defined in 3GPP TS36.141 as test patterns for BTS Tx tests are easily measured by selecting the test model name.



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Downlink

MS269xA/MS2830A-E-L-1

Slide 23

Detail Setting Screen



Detailed parameter settings, such as channel estimation ON/OFF.

Selecting Test Model Name measures Test Model signals

/I M	38 LTE-TDD Downlink	1/23/2011 20:53:
Carr	Test Model Off	On/Off Power Boosting stailSettings
Test	Test Model Version	PBCH V Manual 0.000 dB
Chai	3GPP TS36.141 V8.3.0(2009-05)	P−SS 🛛 Manual 🔽 0.000 🔂 dB
Resi	Test Model Starting Frame Type UnLock	S−SS 🛛 Manual 💌 0.000 🛨 dB Default Values
MK	Synchronization Mode	PDCCH 🔽 Manual 🗾 1.195 🛱 dB
Sub Sym	Synchronization Signal 💌	PCFICH 🔽 Manual 💌 0.000 🗮 dB
Phys	Cell ID 1	PHICH 🔽 Manual 💌 0.000 🗧 dB
	Reference Signal Power Boosting 0.000 🗄 dB	B PDSCH Auto 0.000 🛱 dB
l Q	Number of Antenna Ports 1 • Antenna Port 0 •	PHICH Ng 1/6
		PHICH Duration Normal 🔽
	Measurement Filter Type Normal 💌	Number of PDCCH Symbols Manual
Fra	Extended Freq Lock Range	Subframe 1 and 6
EVM		Other Subframes
		PDCCH Mapping Easy V
		PDCCHFormat 1
		Number of PDCCHs 10
		✓ Channel Estimation
		PDSCHEVMCalculation Set
		3GPP
		DwPTS Exclude
E ro		Cancel
Fra Ref.l		Set Cancel

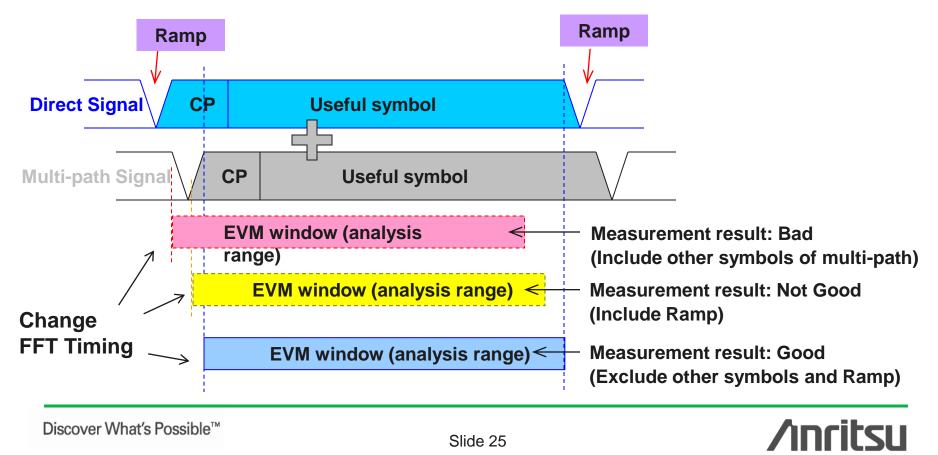
/inritsu

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Slide 24

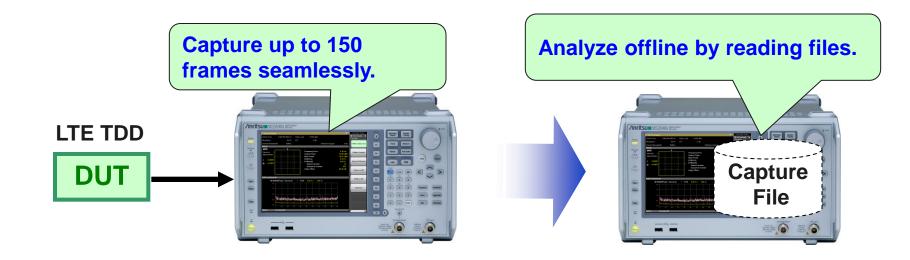
EVM Window Length Function

The EVM Window Length function supports flexible changing of FFT timing, which is useful for verification, such as the effect of multi-paths and Ramps.



Replay Function for Troubleshooting Faults

Up to 150 frames of LTE TDD signals can be captured as a file for replay by the LTE TDD measurement software to perform analyses, such as EVM measurement.



Example of R&D use

Save data for comparing each DUT test version

 \Rightarrow Supports comparison of retrofitting improvement effects

Example of production line use

Save shipping inspection data

 \Rightarrow Supports rechecking of performance data for troubleshooting post-shipping faults

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Slide 26







MX269022A-001 LTE-Advanced TDD Downlink Measurement Software

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Batch Measurement Function

Batch Measurement Function

One measurement supports modulation analysis for all component carriers configuring carrier aggregation signals.

Measurement results, such as EVM and frequency errors for each band and component carriers, improves the efficiency.

The LTE-Advanced Carrier Aggregation measurement range varies as follows, depending on the Analysis Bandwidth Extension option configuration.

Using the 125-MHz analysis bandwidth hardware option (Opt-078) with the MS269xA/MS2830A enables presetting of the carrier aggregation signal to measure

up to three frequency bands (one band with MS2830A) and a total of five carrier components in one simple operation.

	Model	LTE-Advanced Carrier Aggregation Signal			
Main frame	Analysis Bandwidth Extension	Number of	Number of		
main trame	Option Configuration	Band	Component Carrier		
	Opt. 078/004 ⁺¹ installed	3	5 max. (total of 3 bands)		
MS269xA	Opt. 077*2 installed	3	3 max. (1 component carrier per band)		
	Standard	3	3 max. (1 component carrier per band)		
	Opt. 078*3 installed	1	5 max.		
MS2830A	Opt. 077*4 installed	3	3 max. (1 component carrier per band)		
	Opt. 005/009*5 installed	3	3 max. (1 component carrier per band)		

1 MS2692A LTE-T	DD Downlink							3/14/2013 16:51
								🛛 🎆 LTE-TDD Downli
								Batch Meassurement
								Batch Settin
Result					Average 8	LMax 1	01 1	
Band	20		2 1		#2			
Center Freq. [MHz]	2110.00		734.00		1495.90			
Status	2110.00				142.0830			
Storage Count	10	/10	10/	10	-10)/10		
forage Count fodulation Analysis	10	/ 10	107	10				
Freq. Error [Hz]	0.01	/ 0.26	0.17/	0.36	0.0	o /	0.45	
PDSCH EVM [X]	0.47		0.44 /		0.0		0.40	
Band Power [dBm]	-18.54		-17.96 /		-15.43		-15.43	
RS Power [dBm]	-18.34		-51.75 /				-46.21	
OSTP [dBm]	-21.51		-20.96 /		-15.41		-15.41	
CC #0		#1	#2	#3		#4		
Band #0 Freq. Offset[MHz] 0.00		#0 19.80	#1	#1		#2 0.00		
	0.03 / -0.20		0.00		.23 / 0.40	0.00	0.4	5
	0.46 / 0.46		0.49 0.41 /		.46 / 0.47	0.087	0.4	
	21.01 / -21.00		2.17 -20.28 /		.79 / -21.79	-15.43 /	-15.4	
	51.79 / -51.79		2.94 -51.06 /		.58 / -52.57	-46.21 /	-46.2	
	20.94 / -20.94		2.15 -20.28 /		.75 / -21.75	-15.41 /	-15.4	
lef.Ext Pr	e-Amp Off							
	e-Amp On							1 of 2

*1: MS269xA-078 Analysis Bandwidth Extension to 125 MHz MS269xA-004 Analysis Bandwidth Extension to125 MHz

- *2: MS269xA-077 Analysis Bandwidth Extension to 62.5 MHz
- *3: MS2830A-078 Analysis Bandwidth Extension to125 MHz
- *4: MS2830A-077 Analysis Bandwidth Extension to 62.5 MHz
- *5: MS2830A-005 Analysis Bandwidth Extension to 31.25 MHz MS2830A-009 Analysis Bandwidth Extension to 31.25 MHz for Millimeter-wave



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Slide 28 MS269xA/MS2830A-E-L-1

Batch Measurement FunctionParameter setting (1/6)

Simply selecting from a pull-down menu without numeric values sets measurement parameters for the carrier aggregation band and component carrier before measurement.

[Common Settings]

- Storage Mode: Off, Average, Average & MAX
- Storage Count: 2 to 9999
- Starting Subframe Number: 0 to 9 (Sets the analysis starting position.)
- Measurement Interval: 1 to (10 Common Settings : Starting Subframe Number)

(Sets the analysis subframe length (Measurement Interval). Each measurement result is the value averaged at the interval set by this parameter.)

[Band Settings]

- Measurement Item: Band #0, Band #1, Band #2

(When the MX269020A-001 is not installed, it is fixed to Band 0. When MS2830A and the wideband option (Opt.078) are installed to the mainframe, this is fixed to Band 0.)

- Carrier Frequency:

30 MHz to the upper limit of the main unit (When the wideband option (x78) is not installed)

100 MHz to the upper limit of the main unit (When MS269xA and the wideband option (Opt.078) are installed to the mainframe) 300 MHz to the upper limit of the main unit (When MS2830A and the wideband option (Opt.078) are installed to the mainframe)

- Input Level:

For Pre-Amp: On : (-80.00 + Offset Value) to (10.00 + Offset Value) dBm For Pre-Amp: Off: (-60.00 + Offset Value) to (30.00 + Offset Value) dBm

- Pre-Amp: On, Off
- Level Offset: On, Off
- Offset Value: -99.99 to +99.99 dB
- Contiguous Mode: On, Off (When the MX269020A-001 and the wideband option (Opt.078) is not installed, it is fixed to Off.)

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Slide 29

UTE-TDD Downlink	×
Batch Settings	
Common Settings Band Settings Carrier Component Settings	
Storage Mode/Count Off 10 10	
Subframe Start/Interval 0 🕂 / 10 🕂	

LTE-TDD Downlink			
atch Settings			
ommon Settings Band Se	ttings Carrier Compone	nt Settings	
	☑ Band #0	🗆 Band #1	Band #2
arrier Frequency	2140000000 🗄	1960000000 🗄	1842500000 🗄
nput Level	-10.00	-10.00 ÷	-10.00 +
Pre-Amp	Off 🔹	Off	Off 🔹
evel Offset	Off 🔹	Off	Off
Offset Value	0.00	0.00	0.00 +
ontiguous Mode	Off	Off	Off



Batch Measurement FunctionParameter setting (2/6)

[Carrier Component Settings]

- • Measurement Item: CC#0 to #4 (1 component carrier per band for MS269xA with Opt-077, standard MS269xA, or M2830A with Opt-077/005/009.)
- Frequency Band: Band#0 to #2

(Fixed to Band 0 for MS2830A with Opt-078.)

- Frequency Offset:

-50000000 + (Channel Bandwidth/2) to 50000000 - (Channel Bandwidth/2) Hz

Resolution: 300kHz (Contiguous Mode: On) 1Hz (Contiguous Mode: Off) (When the MX269020A-001 and the wideband option (Opy.078) is not installed, it is fixed to 0 Hz.)

- Channel Bandwidth: 1.4/3/5/10/15/20MHz
- Test Model: Off/E-TM1.1/E-TM1.2/E-TM2/ E-TM3.1/E-TM3.2/E-TM3.3
- Synchronization Mode:
 - SS (Synchronization Signal)
 - RS (Reference Signal)

(If SS is selected, the input signal includes Primary Synchronization Signal (P-SS) and Secondary Synchronization Signal (S-SS).)

- Reference Signal Mode: Auto, Using Cell ID
- Cell ID: 0 to 503

🐺 LTE-TDD Downlink					×
Batch Settings					
Common Settings Band Setti	ngs Carrier Comp	onent Settings			
	▼ CC #0	☑ CC #1	☑ CC #2	I CC #3	🗹 CC #4 🔶
Frequency Band	Band #0 💌	Band #0 💌	Band #1 💌	Band #1 💌	Band #2 💌
Frequency Offset	0	19800000	0	19800000 🗧	0÷
Bandwidth	20MHz 💌	20MHz 💌	20MHz 💌	20MHz 💌	20MHz 💌
Test Model	E-TM3.1	E-TM3.1	E-TM3.1 💌	E-TM3.1	E-TM3.1
Starting Frame Type	UnLock	UnLock 🔽	UnLock 💌	UnLock 🔽	UnLock 💌
UL-DL Configuration	3	3	3 🕂	3 🕂	3 🕂
Special SubF Configuration	8 🗧	8	8 🗄	8 ÷	8 🗧
Synchronization Mode	SS	SS	SS 💌	SS 🔽	SS 💌
Cell ID	1 ÷	1	1 🗄	1 🗧	1 🗧
Power Boosting					
CRS	0.000	0.000	0.000	0.000 🕂	0.000 🗧
Number of Antenna Ports					
CRS	1	1 💌	1	1	1
CSI-RS	1	1 💌	1	1	1
Antenna Port					
CRS	0			0 ÷	0 🕂
CSI-RS	15 🕂	15 🕂	15 🗧	15 🛨	15 🕂
PDSCH Modulation Scheme	AUTO 🔽	AUTO 🔽	AUTO 🔽	AUTO 🔽	AUTO 🔽
EVM Window Length	w _] w 💽	w 💌	W 🔹	w 🔹
Ts	136 🗧	136	136 🛨	136 🗦	136 🗦
W	136 🗧	136	136 🕂	136 🗦	136 🗦
Channel Estimation	☑ On/Off	☑ On/Off	☑ On/Off	On/Off	On/Off
DwPTS	Exclude •	Exclude •	Exclude 💌	Exclude •	Exclude 💌
Measurement Filter Type	Normal	Normal 🔹	Normal 💌	Normal 💌	Normal 🔹
				0-1	
				Set	Cancel

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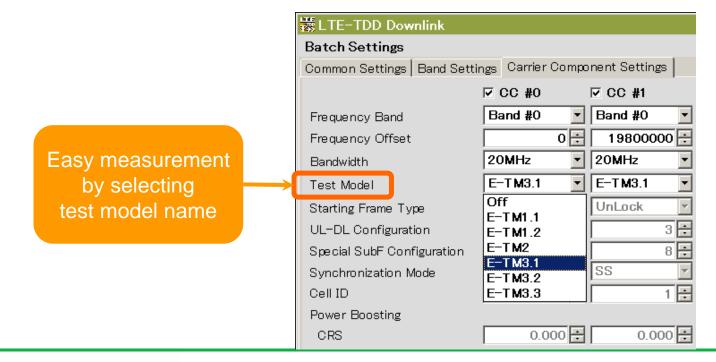
Batch Measurement FunctionParameter setting (3/6)

[Carrier Component Settings]

- Easy Measurement of Test Model Signals -

E-TM1.1 / E-TM1.2 / E-TM2 / E-TM3.1 / E-TM3.2 / E-TM3.3

Test model signals defined in 3GPP TS 36.141 as test patterns for BTS Tx tests are easily measured by selecting the test model name.



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Batch Measurement Function

Parameter setting (4/6)

[Carrier Component Settings]

- CRS Power Boosting: -20.000 to +20.000dB
- CRS Number of Antenna Ports: 1, 2, 4
- CSI-RS Number of Antenna Ports: 1, 2, 4, 8
- CRS Antenna Port: 0 to CRS Number of Antenna Ports - 1

- CSI-RS Antenna Port:

15 to CSI-RS Number of Antenna Ports+14

- PDSCH Modulation Scheme: QPSK, 16QAM, 64QAM, AUTO

- EVM Window Length:

Ts : 0 to 142

- W: 0 to 8 (Channel Bandwidth: 1.4MHz)
 - 0 to 17 (Channel Bandwidth: 3MHz)
 - 0 to 35 (Channel Bandwidth: 5MHz)
 - 0 to 71 (Channel Bandwidth: 10MHz)
 - 0 to 106 (Channel Bandwidth: 15MHz)
 - 0 to 142 (Channel Bandwidth: 20MHz)

- Channel Estimation: On/Off

- Measurement Filter Type:

Normal (Use this when measuring single carrier signal.)

Narrow (Use this when measuring multi-carrier signal. This measures one carrier signal.)

(This can be set when Band Settings: Contiguous Mode is set to Off.)

LTE-TDD Downlink					
Batch Settings					
Common Settings Band Setti	ngs Carrier Comp	onent Settings			
	CC #0	I CC #1	CC #2	CC #3	CC #4
Frequency Band	Band #0 💌	Band #0 💌	Band #1 💌	Band #1 🗾	Band #2 💌
Frequency Offset	0 ÷	19800000 🕂	0 ÷	19800000 🗧	0 ÷
Bandwidth	20MHz 💌	20MHz 💌	20MHz 💌	20MHz 💌	20MHz 💌
Test Model	E-TM3.1	E-TM3.1 💌	E-TM3.1	E-TM3.1	E-TM3.1 💌
Starting Frame Type	UnLock 💌	UnLock 💌	UnLock 💌	UnLock 🗾	UnLock 🗾
UL-DL Configuration	3 🗧	3 🕂	3 🗧	3 🗧	3
Special SubF Configuration	8 🗧	8 🕂	8 🗄	8 🗄	8 ÷
Synchronization Mode	SS	SS	SS 🔽	SS 🔽	SS 💌
Cell ID	1 🗧	1 🗄	1 🗄	1 🗄	1 🗧
Power Boosting					
CRS	0.000 🗧	0.000 🕂	0.000 🗧	0.000 🗧	0.000
Number of Antenna Ports					
CRS	1 💌	1	1	1	1 💌
CSI-RS	1 🔽	1	1 🔽	1 🔽	1 💌
Antenna Port					
CRS	0÷	0.5	0÷		0
CSI-RS	15 🗧	15 🕂	15 🗧	15 🗧	15 🗧
PDSCH Modulation Scheme	AUTO 🔽	AUTO 🔽	AUTO 🔽	AUTO 🔽	AUTO 💌
EVM Window Length	W 💌	W 💌	W 💌	w 💌	w <u>-</u>
Ts	136 🗦	136 🕂	136 🗦	136 🗦	136 🗧
W	136 🗦	136 🕂	136 🗦	136 🗦	136 🗧
Channel Estimation	On/Off	On/Off		On/Off	On/Off
DwPTS	Exclude -	Exclude 💌	Exclude -	Exclude 💌	Exclude 💌
Measurement Filter Type	Normal 🔹	Normal 💌	Normal 💌	Normal 💽	Normal

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Batch Measurement Function Parameter setting (5/6)

[Carrier Component Settings]

- PBCH: On/Off
- PBCH Power Boosting: Auto, Manual
- PBCH Power Boosting: -20.000 to +20.000dB
- P-SS: On/Off
- P-SS Power Boosting: Auto, Manual
- P-SS Power Boosting: -20.000 to +20.000dB
- S-SS: On/Off
- S-SS Power Boosting: Auto, Manual
- S-SS Power Boosting: -20.000 to +20.000dB
- PDCCH: On/Off
- PDCCH Power Boosting: Auto, Manual
- PDCCH Power Boosting: -20.000 to +20.000dB
- PCFICH: On/Off
- PCFICH Power Boosting: Auto, Manual
- PCFICH Power Boosting: -20.000 to +20.000dB
- PHICH: On/Off
- PHICH Power Boosting: Auto, Manual
- PHICH Power Boosting: -20.000 to +20.000dB
- PDSCH Power Boosting: Auto, Manual
- PDSCH Power Boosting: -20.000 to +20.000dB
- PHICH Ng: 1/6, 1/2, 1, 2
- PHICH Duration: Normal, Extended
- PDCCH Symbols: Auto, Manual
 - $0 \ to \ 4 \ (\text{Channel Bandwidth}: 1.4 \ \text{MHz})$

 $0 \ to \ 3$ (Channel Bandwidth : other than 1.4 MHz)

PBCH	🔽 On/Off	☑ On/Off	🔽 On/Off	🔽 On/Off	🔽 On/Off 📃
Power Boosting	Manual 💌	Manual 💌	Manual 💌	Manual 💌	Manual 🔽
	0.000 🗧	0.000 🗧	0.000 🗧	0.000 🗧	0.000 ÷
P-SS	🔽 On/Off	☑ On/Off	On/Off	On/Off	On/Off
Power Boosting	Manual	Manual 💌	Manual 💌		Manual 🔽
	0.000	0.000 🗧	0.000 +	0.000 🗧	0.000 ÷
S-SS	☑ On/Off	☑ On/Off	On/Off	On/Off	On/Off
Power Boosting	Manual	Manual 💌	Manual 🔻	Manual 🔽	Manual
	0.000	,	0.000	0.000	0.000 🗧
PDCCH	On/Off	☑ On/Off	On/Off	On/Off	On/Off
Power Boosting	Manual	Manual 💌	Manual 💌	Manual 💌	Manual
	1.195		1.195	1.195	1.195
POFICH	On/Off	On/Off	On/Off	On/Off	On/Off
Power Boosting	Manual	Manual 🔻	Manual 💌	Manual 🔽	Manual 💌
	0.000	,	0.000	0.000	0.000
PHICH	On/Off	On/Off	On/Off	On/Off	On/Off
Power Boosting	Manual	Manual 💌	Manual 💌	Manual 🗾	Manual 🔻
555511	0.000	0.000 +	0.000 +	0.000	0.000 ÷
PDSCH					
Power Boosting	Manual	Manual 💌	Manual 🔻	Manual 🔻	Manual 🔻
PHICH Ng	0.000	0.000 +	0.000 +	0.000 +	0.000 +
-	Normal				
PHICH Duration		Normal 💌	Normal 🔽	Normal 🔽	Normal -
PDCCH Symbols	Manual	Manual 🔻	Manual 💌	Manual 🔽	Manual 💌
Subframe 1 and 6	1		1 🗄	1 🕂	
Others	1 🗧	1 🗄	1 🗄	1 🗧	1 🗧
PDCCH Mapping	Easy	Easy	Easy 💌	Easy 🔽	Easy
PDCCH Format	1	1	1	1	1
Number of PDCCHs	10 ÷	10 🗧	10÷	10 🗧	10 🗧
CSI-RS	Con/Off	On/Off			On/Off
Configuration	0	0÷	0÷	0÷	0÷
Periodicity T	5 💌	5	5	5 💌	5 💌
Subframe Offset Delta	0 ÷	0 ÷	0÷	0÷	0 🕂 🖵
				Set	Cancel

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Batch Measurement Function

Parameter setting (6/6)

[Carrier Component Settings]

- PDCCH Mapping:

Sets mapping of PDCCH and NIL (dummy PDCCH) to the control channel elements (CCEs).

- Auto: Automatically evaluates and measures PDCCH and NIL
- Full: Performs measurement assuming that only PDCCHs are mapped (no NIL). Even if REG is a value smaller than the CCE unit, measurement is performed assuming that PDCCHs are mapped.
- Easy: Performs measurement for all subframes according to the PDCCH mapping that is determined by the PDCCH Format and Number of PDCCHs parameters. Measurement is performed assuming that PDCCHs are mapped sequentially from the first CCE for the number specified by Number of PDCCHs in the unit specified by PDCCH Format.

- PDCCH Format: 0 to 3

(This setting applies if CC Settings:PDCCH Mapping is set to Easy.)

- Number of PDCCHs: 1 to 88

(This setting applies if CCSettings: PDCCH Mapping is set to Easy.)

- CSI-RS: On/Off

- CSI-RS Configuration:

0 to 4 (CSI-RS Number of Antenna Ports :8)

0 to 9 (CSI-RS Number of Antenna Ports :4)

0 to 19 (CSI-RS Number of Antenna Ports :2)

0 to 19 (CSI-RS Number of Antenna Ports :1)

- CSI-RS Periodicity T: 5, 10
- CSI-RS Subframe Offset:
 - 0 to 9 (CSI-RS Periodicity T: 10)
 - 0 to 4 (CSI-RS Periodicity T: 5)

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PBCH	🔽 On/Off	🔽 On/Off	🔽 On/Off	🔽 On/Off	🗹 On/Off 📃 🔺
Power Boosting	Manual 💌	Manual 💌	Manual 💌	Manual 🗾	Manual 💌
	0.000	0.000 🗧	0.000 ÷	0.000 🗧	0.000 +
P-SS	🔽 On/Off	🔽 On/Off	🔽 On/Off	🔽 On/Off	🗹 On/Off
Power Boosting	Manual	Manual 💌	Manual	Manual 💌	Manual 🔽
	0.000	0.000 ÷	0.000	0.000 🛨	0.000 🗧
S-SS	☑ On/Off	☑ On/Off	On/Off	☑ On/Off	🔽 On/Off
Power Boosting	Manual	Manual 🔽	Manual 🔽	Manual 💌	Manual 🔽
	0.000	0.000 🗧	0.000 ÷	0.000 +	0.000 ÷
PDCCH	☑ On/Off	☑ On/Off	☑ On/Off	On/Off	On/Off
Power Boosting	Manual	Manual 💌	Manual 💌	Manual 💌	Manual 🔽
	1.195 🗧	.,		1.195 🗧	1.195 🛨
POFICH	☑ On/Off	On/Off	M On/Off	On/Off	Ø On/Off
Power Boosting	Manual	Manual 💌	Manual	Manual	Manual
	0.000	.,		0.000	
PHICH	☑ On/Off	☑ On/Off	▼ On/Off	☑ On/Off	☑ On/Off
Power Boosting	Manual	Manual 💌	Manual	Manual	Manual 💌
	0.000	0.000 ÷	0.000 ÷	0.000 🛨	0.000 🗧
PDSCH					
Power Boosting	Manual	Manual 💌	Manual	Manual 💌	Manual 💌
5. 5	0.000		0.000 ÷	0.000 ÷	
PHICH Ng	1/6	1/6	1/6	1/6 💌	1/6
PHICH Duration	Normal	Normal 💌	Normal	Normal 💌	Normal
PDCCH Symbols	Manual	Manual 💌	Manual	Manual	Manual
Subframe 1 and 6	1		1 🗄	1 🗄	
Others	1 :	1 🗄	1 🗄	1 🕂	1 :
PDCCH Mapping	Easy 🔻	Easy 🔽	Easy 🔻	Easy 🔽	Easy 🔽
PDCCH Format	1	1	1	1	1
Number of PDCCHs	10 🗧	10 🕂	10 🕂	10 🕂	10 +
CSI-RS	🗖 On/Off	🗖 On/Off	🗖 On/Off	🗖 On/Off	□ On/Off
Configuration	0	0	0 :	0 ÷	0
Periodicity T	5 💌	5 💌	5 💌	5 💌	5
Subframe Offset Delta	0	0	0:	0:	
				Set	Cancel

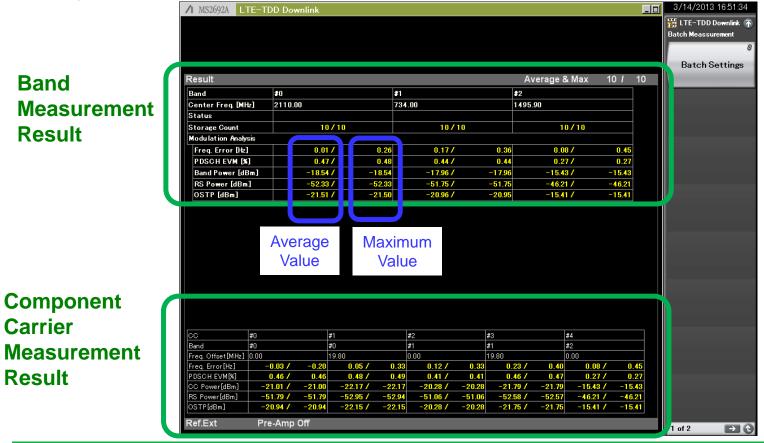


Slide 34 MS269xA/MS2830A-E-L-1

Batch Measurement Function Batch Measurement Result Display (1/3)

Measurement results, such as EVM and frequency errors for each band and component carriers, are displayed at one time.

Choosing Average & Max displays average and maximum values on same screen. This is useful for evaluating DUT dispersion.



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Batch Measurement Function Batch Measurement Result Display (2/3)

Band Measurement Result Display

- Band: Band #0 to #2
- Frequency Error: Displays the average frequency error of the CC included in Band.
- PDSCH EVM: Displays the average PDSCH EVM of the CC included in Band.
- Band Power: Displays the RF level of the Band.

When the wideband option (Opt.078) is not installed, no measurement results are displayed.

When the wideband option (Opt.078) is installed, the measurement result of 125 MHz bandwidth is displayed.

- **RS Power:** Displays the average RS power value of the CC included in Band.
- OSTP: Displays the average OSTP of the CC included in Band.

Band	# 1		# 2			
Center Freq. [MHz]	2110.00	2110.00 73		734.00		
Status						
Storage Count	10/10		10/10		10/10	
Modulation Analysis						
Freq. Error [Hz]	0.01 /	0.26	0.17/	0.36	0.08 /	0.45
PDSCH EVM [X]	0.47 /	0.48	0.44 /	0.44	0.27 /	0.27
Band Power [dBm]	-18.54 Z	-18.54	-17.96 /	-17.96	-15.43 /	-15.43
RS Power [dBm]	-52.33 /	-52.33	-51.75 /	-51.75	-46.21 /	-46.21
OSTP [dBm]	-21.51 /	-21.50	-20.96 /	-20.95	-15.41 /	-15.41

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Batch Measurement Function Batch Measurement Result Display (3/3)

Component Carrier Measurement Result Display

- Frequency Error: Displays the average frequency error of the CC.
- **PDSCH EVM:** Displays the average PDSCH EVM of the CC.
- CC Power: Displays the average RF level of the CC.
- **RS Power:** Displays the RS power value of the CC.
- **OSTP:** Displays the OSTP of the CC

CC Band Freq. Offset[MH Freq. Error[Hz] PDSCH EVM[%] CC Power[dBm] RS Power[dBm] OSTP[dBm]	#	0	#	1		#2		#3		#4	
Band	#	0	#	0		#1		#1		#2	
Freq. Offset[MH	z] 0	.00	1	9.80		0.00		19.80		0.00	
Freq. Error[Hz]		-0.03 /	-0.20	0.05 /	0.33	0.12 /	0.33	0.23 /	0.40	0.08 /	0.45
PDSCH EVM[%]		0.46 /	0.46	0.48 /	0.49	0.41 /	0.41	0.46 /	0.47	0.27 /	0.27
CC Power[dBm]		-21.01 /	-21.00	-22.17 /	-22.17	-20.28 /	-20.28	-21.79 /	-21.79	-15.43 /	-15.43
RS Power[dBm]		-51.79 /	-51.79	-52.95 /	-52.94	-51.06 /	-51.06	-52.58 /	-52.57	-46.21 /	-46.21
OSTP[dBm]		-20.94 /	-20.94	-22.15 /	-22.15	-20.28 /	-20.28	-21.75 /	-21.75	-15.41 /	-15.41
				/							

Average Value N

Maximum Value



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MX269910A LTE TDD IQproducer NEW MX269910A-001 LTE-Advanced TDD Option (MS269xA/MS2830A for Vector Signal Generator option)

Please see the product introduction of MX269910A LTE TDD IQproducer. http://www.anritsu.com/en-us/downloads/product-introductions/product-introduction/DWL8462.aspx

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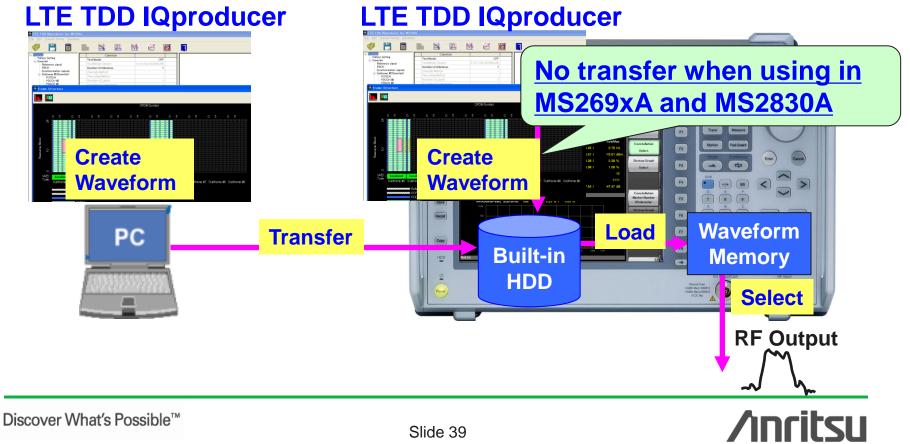


LTE TDD IQproducer

The MX269910A LTE TDD IQproducer is PC application software with a GUI for generating waveform patterns in compliance with the LTE TDD specifications in the 3GPP TS 36.211, TS 36.212, and TS 36.213 standards.

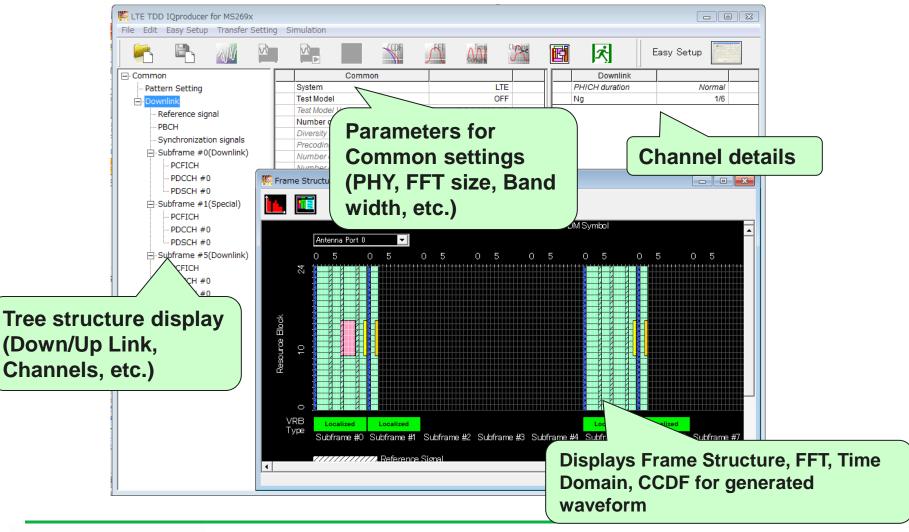
Installing the MX269910A-001* LTE-Advanced TDD option supports output of signals in compliance with the LTE-Advanced TDD standards. *: Requires MX269910A

It runs on both the MS269xA/MS2830A Windows XP OS and on the external PC.



LTE TDD IQproducer – Display Configuration

Excellent operability supports easy waveform generation



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