



SAW Components

SAW Duplexer

Cellular / WCDMA Band V

Series/type:	B8553
Ordering code:	B39881B8553P810
Date:	April 15, 2011
Version:	1.0

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836.50 / 881.50 MHz

Preliminary Data



Revision History

Changes compared to previously issued iteration

Issue	Originator	Detailed specification changes	Date
LJ17D 1.0	D. Penunuri	Initial release	March 10, 2011
B8553 1.0	D. Penunuri	Change to B-code, change Tx band isolation specification to 60 dB	April 15, 2011

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2 April 15, 2011

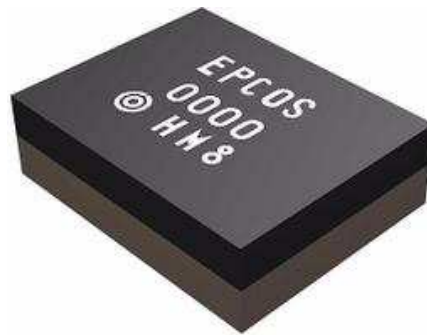


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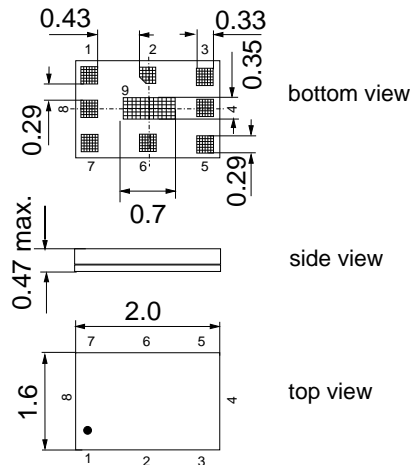
Application

- Multimode SAW duplexer for mobile telephone Cellular WCDMA Band V, Band VI (830-840 MHz) and Band IXX (830-845 MHz) systems
- Low insertion attenuation
- Low amplitude ripple
- High Tx band isolation
- Single ended to balanced transformation in Antenna - Rx path
- Impedance transformation 50Ω to 100Ω in Antenna - Rx path



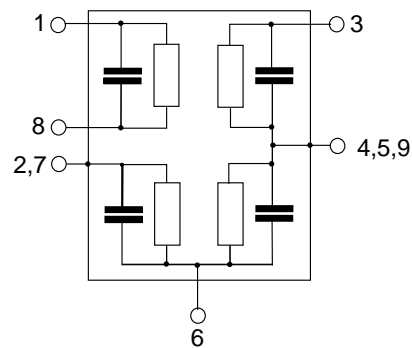
Features

- Component size 2.0 x 1.6 mm²
- Component height 0.47 mm max.
- RoHS compatible
- Package for **Surface Mount Technology (SMT)**
- Ni, gold-plated terminals
- **Electrostatic Sensitive Device (ESD)**
- **Moisture Sensitivity Level (MSL) 3**



Pin configuration

- 3 TX Input
- 1, 8 RX Output (balanced)
- 6 Antenna
- 2, 4, 5, 7, 9 To be grounded



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Characteristics

Temperature range for specification: $T = -30\text{ °C to }+85\text{ °C}$
 Antenna terminating impedance: $Z_{ANT} = 50\ \Omega \parallel 14\text{ nH}$
 RX terminating impedance: $Z_{RX} = 100\ \Omega$ (balanced)
 TX terminating impedance: $Z_{TX} = 50\ \Omega$

Characteristics TX - ANT		min.	typ. @ 25 °C	max.	
Center frequency	f_C		836.5		MHz
Maximum insertion attenuation	α_{max}				
824.0 ... 849.0 MHz			1.8	2.3	dB
@ $f_{Carrier}$ 826.4 ... 846.6 MHz	$\alpha_{WCDMA}^{1)}$		1.5	2.0 ²⁾	dB
Amplitude ripple	$\Delta\alpha$				
824.0 ... 849.0 MHz			0.9	1.3	dB
@ $f_{Carrier}$ 826.4 ... 846.6 MHz	$\alpha_{WCDMA}^{1)}$		0.5	1.0 ²⁾	dB
Error Vector Magnitude					
@ $f_{Carrier}$ 826.4 ... 846.6 MHz	EVM ³⁾		2.0	3.0 ²⁾	%
Input VSWR (TX port)					
824.0 ... 849.0 MHz			1.9	2.2	
Output VSWR (ANT port)					
824.0 ... 849.0 MHz			1.7	2.1	

¹⁾ Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (9).

²⁾ Temperature range for this parameter is -20°C to +85°C.

³⁾ Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.



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Characteristics

Temperature range for specification: T = -30 °C to +85 °C
 Antenna terminating impedance: Z_{ANT} = 50 Ω || 14 nH
 RX terminating impedance: Z_{RX} = 100 Ω (balanced)
 TX terminating impedance: Z_{TX} = 50 Ω

Characteristics TX - ANT

				min.	typ. @ 25 °C	max.	
Absolute attenuation							
			α				
10.0	...	420.0	MHz	30	42		dB
420.0	...	494.0	MHz	35	39		dB
494.0	...	701.0	MHz	30	38		dB
701.0	...	728.0	MHz	35	39		dB
728.0	...	764.0	MHz	35	40		dB
764.0	...	804.0	MHz	30	34		dB
860.0	...	869.0	MHz	3	24		dB
869.0	...	894.0	MHz	44	50		dB
1565.42	...	1573.374	MHz	35	40		dB
1573.374	...	1577.466	MHz	35	40		dB
1577.466	...	1585.42	MHz	35	40		dB
1597.5515	...	1605.886	MHz	35	39		dB
1638.0	...	1708.0	MHz	20	37		dB
1844.9	...	1879.9	MHz	30	34		dB
1884.5	...	1919.6	MHz	29	34		dB
1930.0	...	1990.0	MHz	27	33		dB
2110.0	...	2170.0	MHz	23	31		dB
2400.0	...	2557.0	MHz	23	27		dB
3286.0	...	3406.0	MHz	19	24		dB
4110.0	...	4255.0	MHz	16	19		dB
4934.0	...	5350.0	MHz	10	17		dB
5725.0	...	5953.0	MHz	9	17		dB

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SMD

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Temperature range for specification: T = -30 °C to +85 °C
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 RX terminating impedance: Z_{RX} = 100 Ω (balanced)
 TX terminating impedance: Z_{TX} = 50 Ω

Characteristics ANT - RX		min.	typ. @ 25 °C	max.	
Center frequency	f _C		881.5		MHz
Maximum insertion attenuation	α _{max}				
869.0 ... 894.0 MHz			2.0	2.5	dB
@f _{Carrier} 871.4 ... 891.6 MHz	α _{WCDMA} ¹⁾		1.9	2.2 ²⁾	dB
Amplitude ripple (p-p)	Δα				
869.0 ... 894.0 MHz			0.7	1.2	dB
@f _{Carrier} 871.4 ... 891.6 MHz	α _{WCDMA} ¹⁾		0.6	0.9 ²⁾	dB
Input VSWR (ANT port)					
869.0 ... 894.0 MHz			1.8	2.1	
Output VSWR (RX port)					
869.0 ... 894.0 MHz			2.0	2.3	
Common mode rejection ratio	CMRR				
869.0 ... 894.0 MHz		23 ³⁾	37 ³⁾		dB

¹⁾ Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (9).

²⁾ Temperature range for this parameter is -20°C to +85°C.

³⁾ A combination of 10° phase balance and 1 dB amplitude balance corresponds to 19.6 dB CMRR



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SMD

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Temperature range for specification: T = -30 °C to +85 °C
 Antenna terminating impedance: Z_{ANT} = 50 Ω || 14 nH
 RX terminating impedance: Z_{RX} = 100 Ω (balanced)
 TX terminating impedance: Z_{TX} = 50 Ω

Characteristics ANT - RX

				min.	typ. @ 25 °C	max.	
IMD product level limits¹⁾							
at f_{TX} = 836.5 MHz f_{RX} = 881.5 MHz							
Blocker 1	45.0	MHz			-137	-106	dBm
Blocker 2	791.5	MHz			-114	-109	dBm
Blocker 3	1718.0	MHz			-92	-88	dBm
Blocker 4	2554.5	MHz			-120	-109	dBm
Attenuation							
			α				
10.0	...	447.0	MHz	45	83		dB
447.0	...	824.0	MHz	30	66		dB
824.0	...	849.0	MHz	55	60		dB
849.0	...	854.0	MHz	10	60		dB
909.0	...	1000.0	MHz	13	23		dB
1000.0	...	1850.0	MHz	28	62		dB
1850.0	...	1920.0	MHz	40	62		dB
1920.0	...	6000.0	MHz	35	51		dB

¹⁾ Power levels: 21.5 dBm Tx signal, -15dBm blocker at antenna port.



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 RX terminating impedance: Z_{RX} = 100 Ω (balanced)
 TX terminating impedance: Z_{TX} = 50 Ω

Characteristics TX - RX

					min.	typ. @ 25 °C	max.	
Isolation								
	824.0	...	849.0	MHz	60	67		dB
@f _{Carrier}	826.4	...	846.6	MHz	60 ²⁾	68		dB
	869.0	...	894.0	MHz	50	54		dB
@f _{Carrier}	871.4	...	891.6	MHz	50 ²⁾	53		dB
	1574.0	...	1577.0	MHz	40	72		dB
	1638.0	...	1708.0	MHz	20	71		dB
	2462.0	...	2557.0	MHz	20	63		dB
Common Mode Isolation								
	824.0	...	849.0	MHz	55	60		dB
@f _{Carrier}	826.4	...	846.6	MHz	55 ²⁾	60		dB

¹⁾ Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (9).

²⁾ Temperature range for this parameter is -20°C to +85°C.



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Maximum ratings

Storage temperature range	T _{stg}	-40/+85	°C	machine model, 10 pulses source and load impedance 50 Ω } continuous wave T = 55° C, 1000 h
DC voltage	V _{DC}	5	V	
ESD voltage	V _{ESD}	100 ¹⁾	V	
Input power at 824.0 ... 849.0 MHz elsewhere	P _{IN}	29 10	dBm dBm	

¹⁾ acc. to JESD22-A115A (machine model), 10 negative & 10 positive pulses.

Annotation for characteristics section

Attenuation of WCDMA signal ("Powertransferfunction", α_{WCDMA}) is determined by

$$\int_{-\infty}^{\infty} |S_{ds21}(f)H_{RRC}(f - f_{\text{Carrier}})|^2 df$$

f_{Carrier} according to 3GPP TS 25.101 (e.g. for WCDMA Band 5-Passband, f_{Carrier} ranges from 826.4 MHz (lowest Tx channel) to 846.6 MHz (highest Tx channel)). $H_{RRC}(f)$ is the transfer function of the root-raised cosine transmit pulse shaping filter according to 3GPP TS 25.101 with the following normalization:

$$\int_{-\infty}^{\infty} |H_{RRC}(f)|^2 df = 1$$



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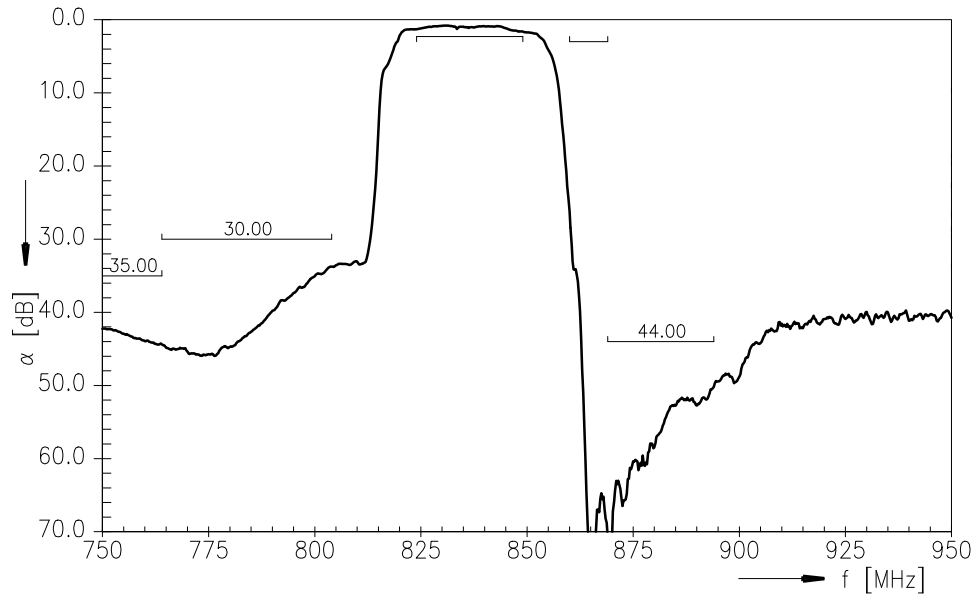
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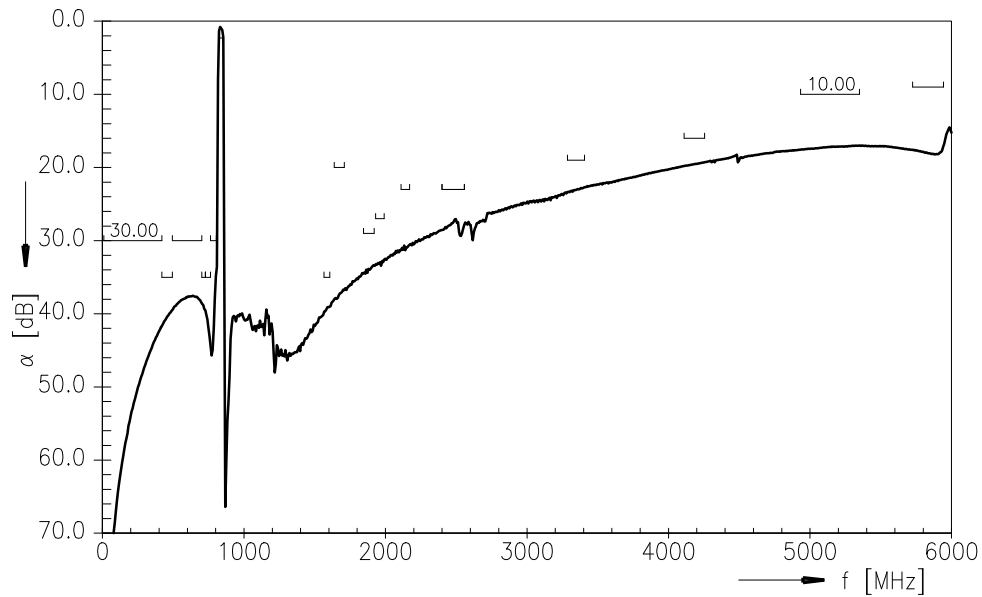
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Frequency Response TX-ANT (Passband)



Frequency Response TX-ANT (Wideband)



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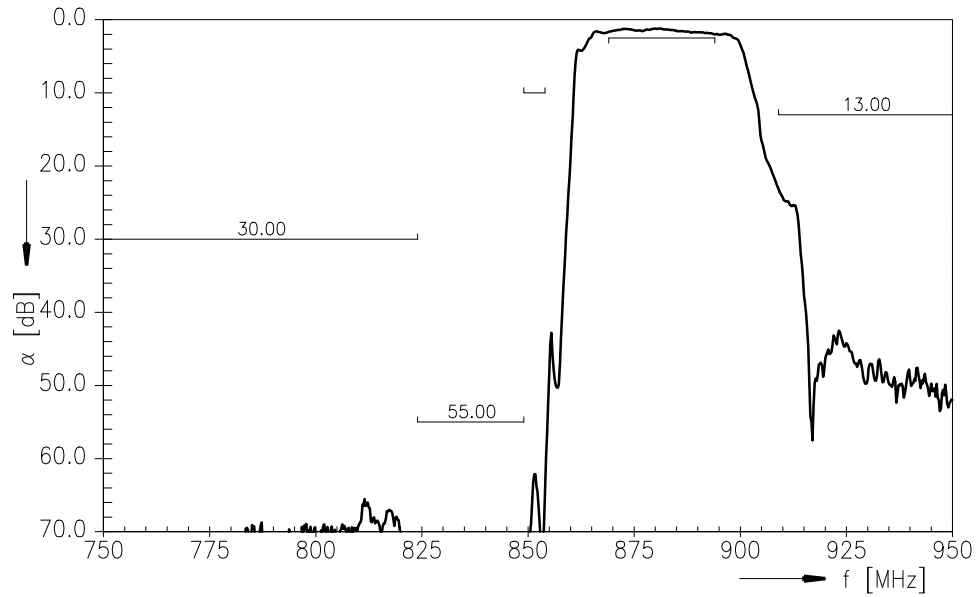
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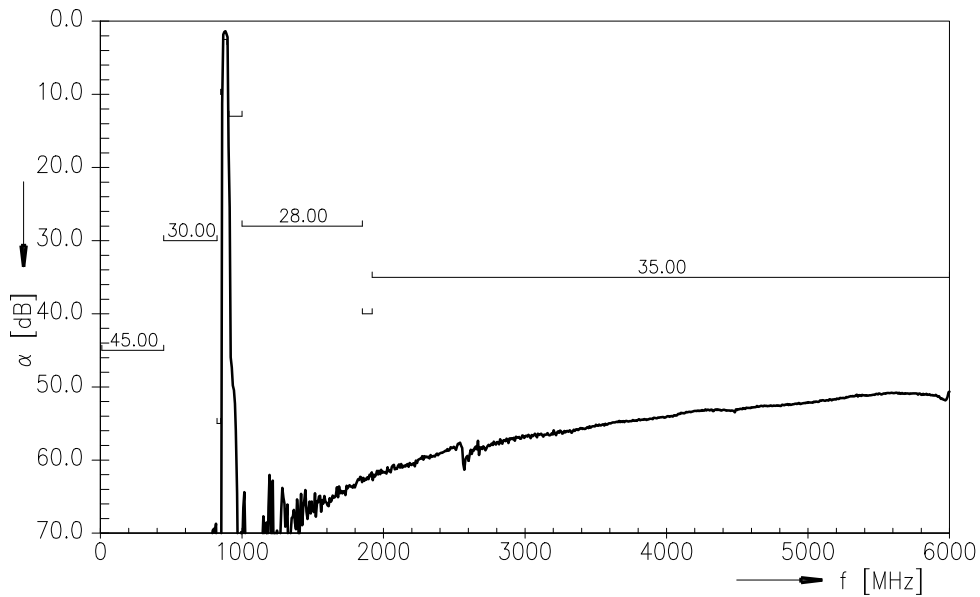
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Frequency Response RX-ANT (Passband)



Frequency Response RX-ANT (Wideband)



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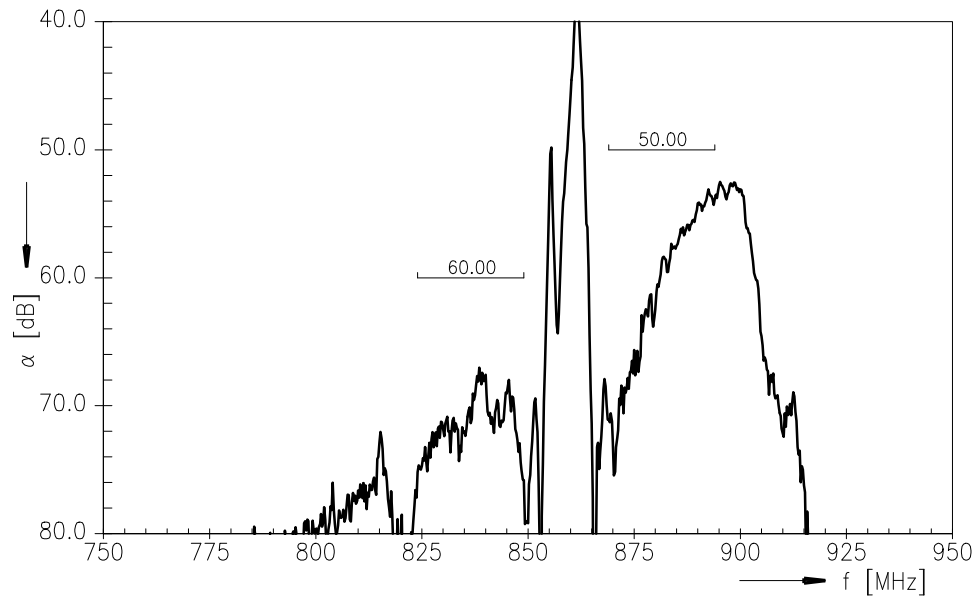
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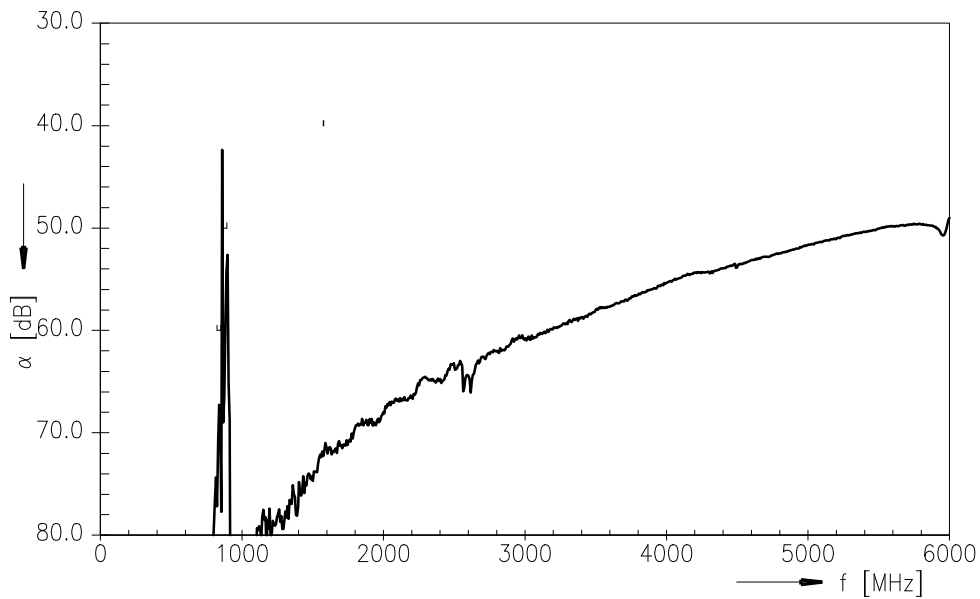
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Frequency Response TX-RX (Passband Differential Mode Isolation)



Frequency Response TX-RX (Wideband Differential Mode Isolation)



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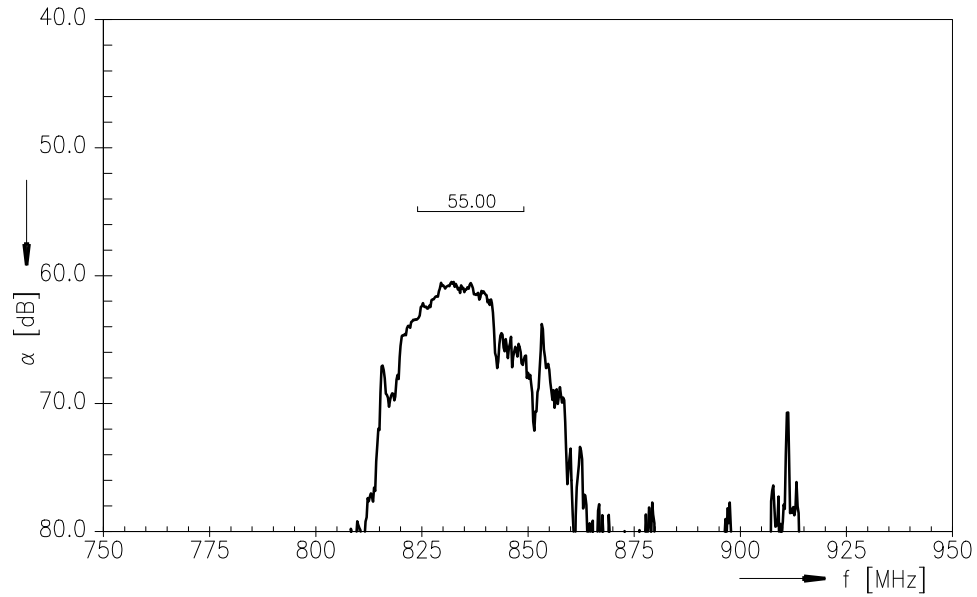
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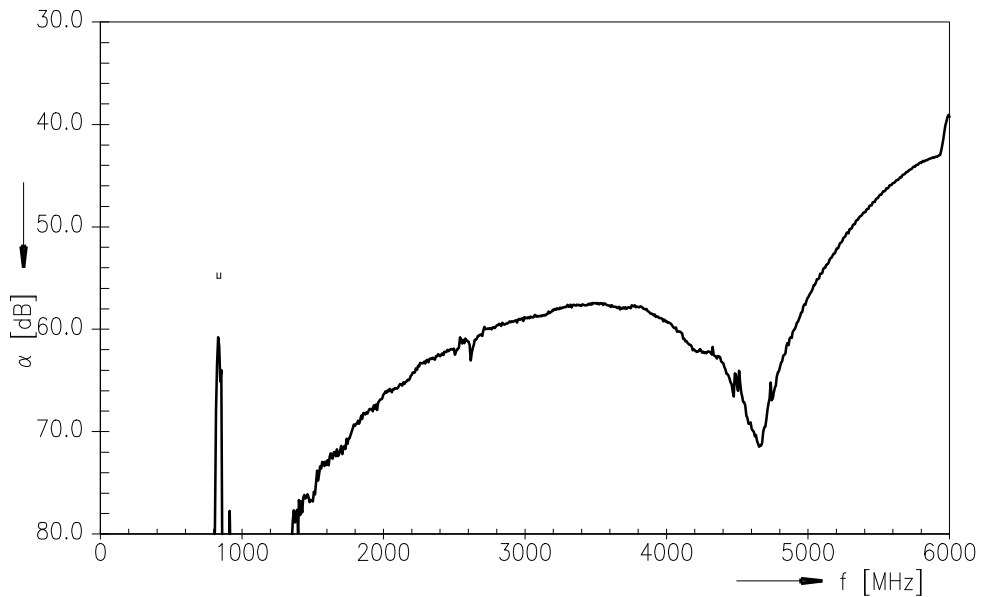
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Frequency Response TX-RX (Passband Common Mode Isolation)



Frequency Response TX-RX (Wideband Common Mode Isolation)



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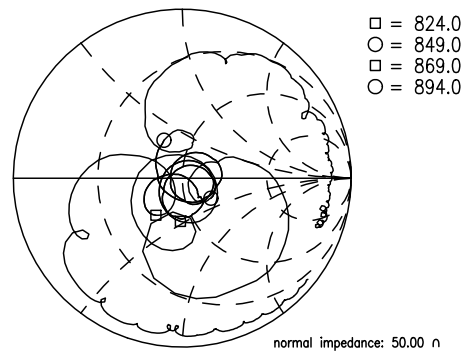
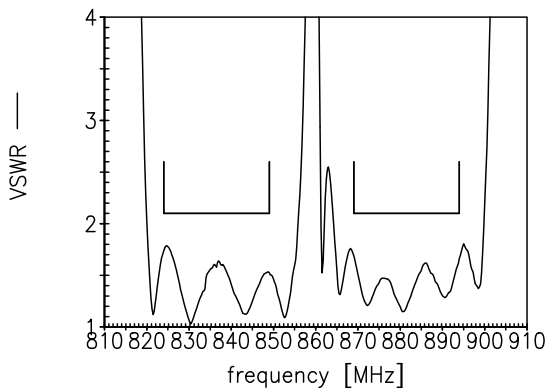
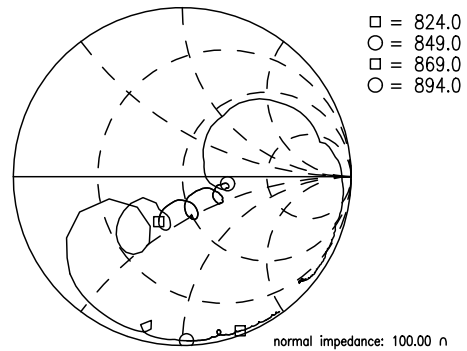
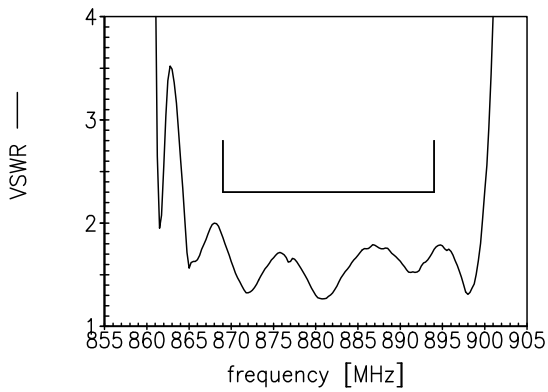
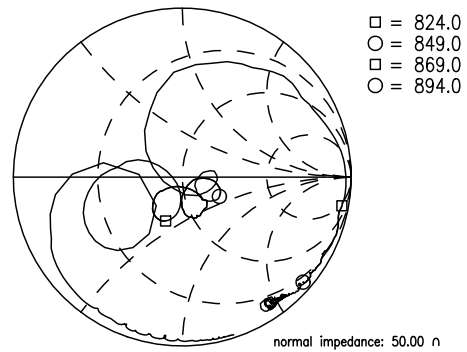
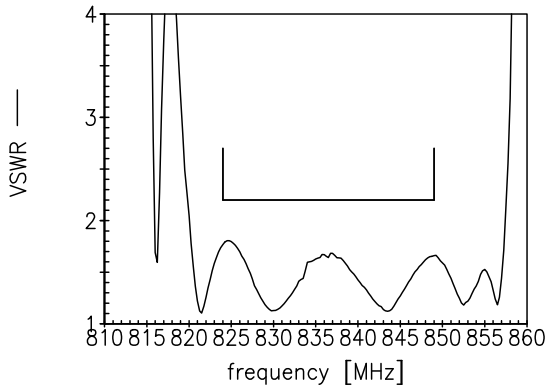
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Matching (TX, RX, ANT)



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References

Type	B8553
Ordering code	B39881B8553P810
Marking and package	F61074-V8247-Z000
Packaging	C61157-A8-A38
Date codes	L_1126
S-parameters	B8553_UN_NB.s4p, B8553_UN_WB.s4p; see file header for pin/port assignments;
Soldering profile	S_6001
RoHS compatible	defined as compatible with the following documents: "DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment. 2005/618/EC from April 18th, 2005, amending Directive 2002/95/EC of the European Parliament and of the Council for the purposes of establishing the maximum concentration values for certain hazardous substances in electrical and electronic equipment."
Matching coils	See Inductor pdf-catalog http://www.tdk.co.jp/tefe02/coil.htm#aname1 and Data Library for circuit simulation http://www.tdk.co.jp/etvcl/index.htm for a large variety of matching coils.

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