

Description

The MXD8545A is a CMOS silicon-on-insulator (SOI), single-pole, four-throw (SP4T) switch. The high linearity and ruggedness performance and extremely low insertion loss makes the device an ideal choice for GSM/WCDMA/LTE handset antenna tuning application.

The MXD8545A SP4T switch is provided in a compact QFN 1.1mm x 1.5mm x 0.38mm package. A functional block diagram is shown in Figure 1. The pin configuration and package are shown in Figure 2. Signal pin assignments and functional pin descriptions are provided in Table 1.

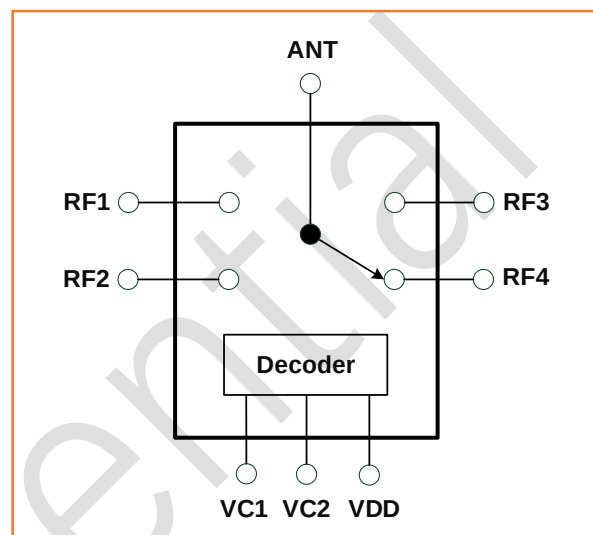


Figure 1 Functional Block Diagram

Features

- Broadband frequency range: 0.4 to 3.8GHz
- Low insertion loss: 0.50dB @2.7GHz
- High Input 0.1dB Compression Point: 43.3dBm
- Wide VDD range: 2.5 to 3.3V
- Positive control voltage range: 1.5V to 3.0V
- Small QFN (10-pin, 1.1mm x 1.5mm x 0.38mm) package, MSL1

Applications

- GSM/WCDMA/LTE band and mode switching
- Antenna tuning switch

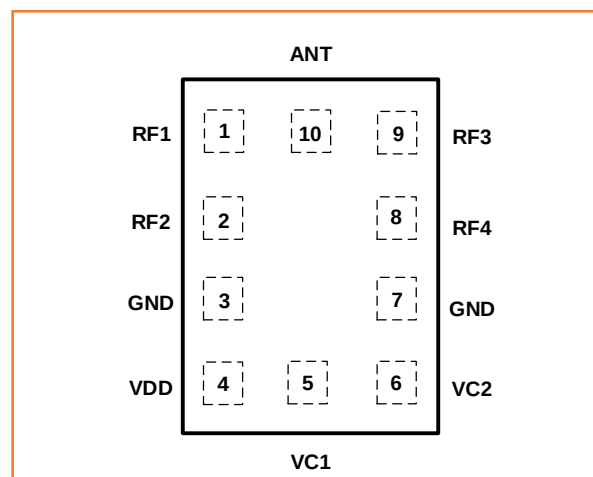


Figure 2 Pin-Out(Top View)

Function Characteristics

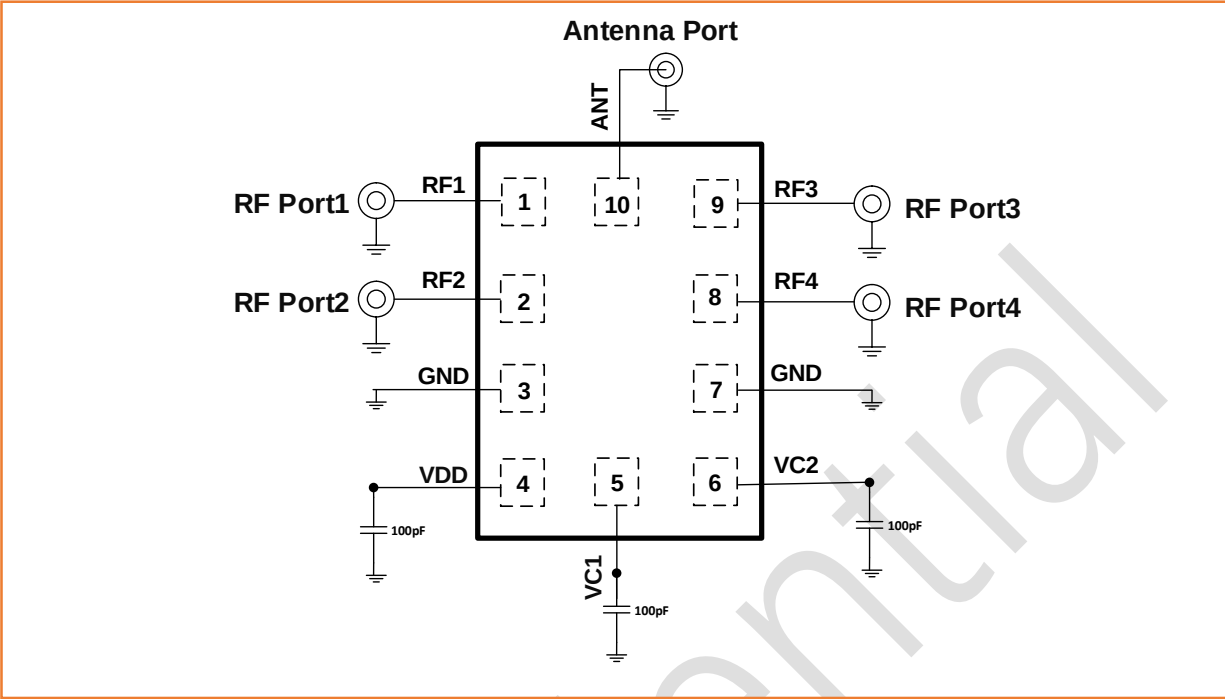


Figure 3 Application Circuit

Table 1 Pin Descriptions

No.	Name	Description	No.	Name	Description
1	RF1	RF Port 1	6	VC2	Logic Control Voltage 2
2	RF2	RF Port 2	7	GND	Ground
3	GND	Ground	8	RF4	RF Port 4
4	VDD	DC Power Supply	9	RF3	RF Port 3
5	VC1	Logic Control Voltage 1	10	ANT	Antenna Port

Table 2 VC Truth Table of for RF Channel Operating Mode

VC1	VC2	RF Channel Operating Mode
Low	Low	ANT to RF1 On
Low	High	ANT to RF2 On
High	Low	ANT to RF3 On
High	High	ANT to RF4 On

Electrical Characteristics

Table 3 Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
DC Supply Voltage	V_{DD}	-0.3	+3.6	V
Digital Control Voltage(VC1/VC2)	V_C	-0.3	+3.6	V
RF Input Peak Power				
20% DC	P_{IN}		+43.8	dBm
VSWR =10:1, CW	P_{IN}		+38.0	dBm
LTE 10M Full RB, VSWR =10:1, CW	P_{IN}		+32.0	dBm
GSM LB, CW and 50% DC	P_{IN}		+40.0	dBm
GSM HB, CW and 50% DC	P_{IN}		+38.0	dBm
Device Operating Temperature	T_{OP}	-40	+90	°C
Device Storage Temperature	T_{STG}	-55	+150	°C
Electrostatic Discharge				
Human Body Model (HBM), Class 2	$V_{ESD(HBM)}$	1500		V
Machine Model (MM), Class B	$V_{ESD(MM)}$	150		V
Charged Device Model (CDM), Class III	$V_{ESD(CDM)}$	500		V

Notice

Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal value. Exceeding any of the limits listed here may result in permanent damage to the device.

Table 4 Recommended Operating Conditions

Parameter	Symbol	MIN	TYP	MAX	Unit
Operating Frequency	F_0	0.4		3.8	GHz
DC Supply Voltage	V_{DD}	2.5	2.8	3.3	V
Logic Control Voltage High	V_{CH}	1.5	1.8	3.0	V
Logic Control Voltage Low	V_{CL}	0	0	0.3	V

Table 5 Nominal Operating Parameters

Parameter	Symbol	Specification			Unit	Condition
		MIN	TYP	MAX		
Normal Condition	V _{DD} =2.8V, V _{CH} =1.8V, V _{CL} =0V, P _{IN} =0dBm, Z _O =50Ω, T _A =25°C, Unless Otherwise Stated					
DC Performances						
DC Supply Current	I _{DD}		75	110	μA	
Current on Logic Control	I _{C1/2}		1	5	μA	
Startup Time	T _{ON}		10	20	μs	50% of final VDD to 90% of the final RF
Switching Speed	T _{SW}		3	5	μs	50% of final VC1/2 to 90% of the final RF
RF Performances						
Insertion Loss (ANT to RF1/2/3/4)	IL		0.35	0.45	dB	F ₀ =0.4 to 1.0GHz
			0.45	0.55	dB	F ₀ =1.0 to 2.2GHz
			0.50	0.70	dB	F ₀ =2.2 to 3.0GHz
			0.75	0.95	dB	F ₀ =3.4 to 3.8GHz
Isolation (ANT to RF1/2/3/4)	ISO	26	28		dB	F ₀ =0.4 to 1.0GHz
		22	24		dB	F ₀ =1.0 to 2.2GHz
		19	22		dB	F ₀ =2.2 to 3.0GHz
		16	19		dB	F ₀ =3.4 to 3.8GHz
Return Loss (ANT to RF1/2/3/4)	RL		20		dB	F ₀ =0.4 to 3.8GHz
Voltage Standing Wave Ratio	VSWR		1.20			F ₀ =0.4 to 3.8GHz
On Resistance (ANT to RF1/2/3/4)	R _{ON}		1.05	1.15	Ω	Switch On Path @DC
Off Capacitance (ANT to RF1/2/3/4)	C _{OFF}		130	150	fF	Switch Off Path @500MHz
Input 0.1dB Compression Point (ANT to RF1/2/3/4)	P _{0.1dB}	+43	+43.3		dBm	F ₀ =950MHz, 20% DC
Peak RF Operating Voltage	V _{RF}		45		V	F ₀ =950MHz, until 3F0 Nonlinear Isolation Mode
LTE TX Harmonic (RF1/2/3/4 to ANT)	2F ₀		-80	-70	dBm	F ₀ = 0.4 to 3.8GHz @+26dBm
	3F ₀		-90	-80	dBm	
GSM LB Harmonic (RF1/2/3/4 to ANT)	2F ₀		-60	-50	dBm	F ₀ = 824 to 915MHz @+35dBm
	3F ₀		-60	-50	dBm	
GSM HB Harmonic (RF1/2/3/4 to ANT)	2F ₀		-60	-50	dBm	F ₀ = 1710 to 1910MHz @+33dBm
	3F ₀		-60	-50	dBm	
2nd Order Intermodulation	IMD2		-112	-105	dBm	Reference to Table 6
3rd Order Intermodulation	IMD3		-112	-105	dBm	Reference to Table 7

Table 6 IMD2 Test Conditions

Band	In-Band Frequency	CW Carrier		CW Interferer	
	MHz	MHz	dBm	MHz	dBm
1 Low	2140	1950	+20	190	-15
1 High	2140	1950	+20	4090	-15
5 Low	881.5	836.5	+20	45	-15
5 High	881.5	836.5	+20	1718	-15

Table 7 IMD3 Test Conditions

Band	In-Band Frequency	CW Carrier		CW Interferer	
	MHz	MHz	dBm	MHz	dBm
1 Low	2140	1950	+20	1760	-15
5 High	881.5	836.5	+20	791.5	-15

Package Outline Dimensions

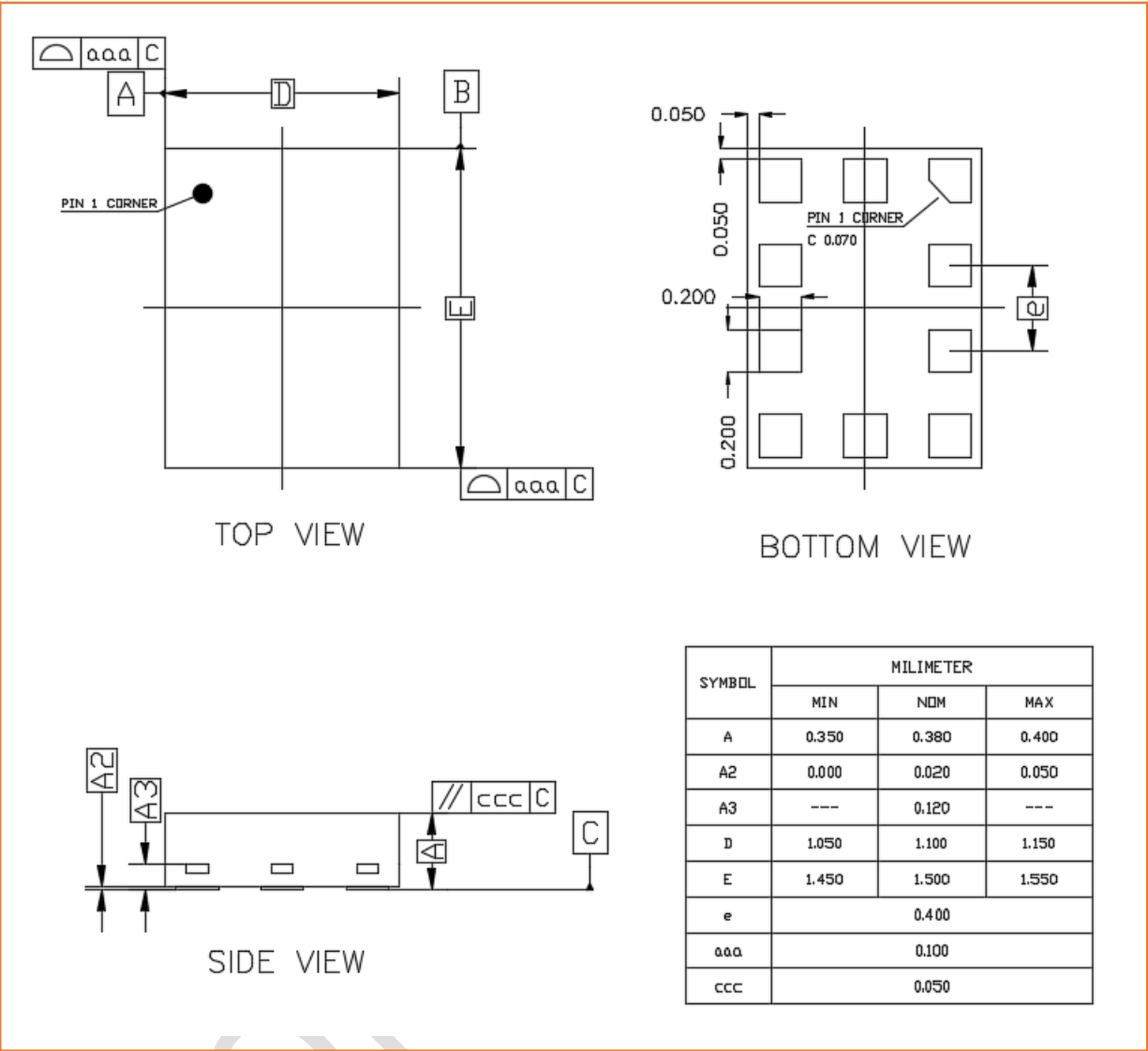


Figure 4 Package Outline Dimensions

Marking Specification

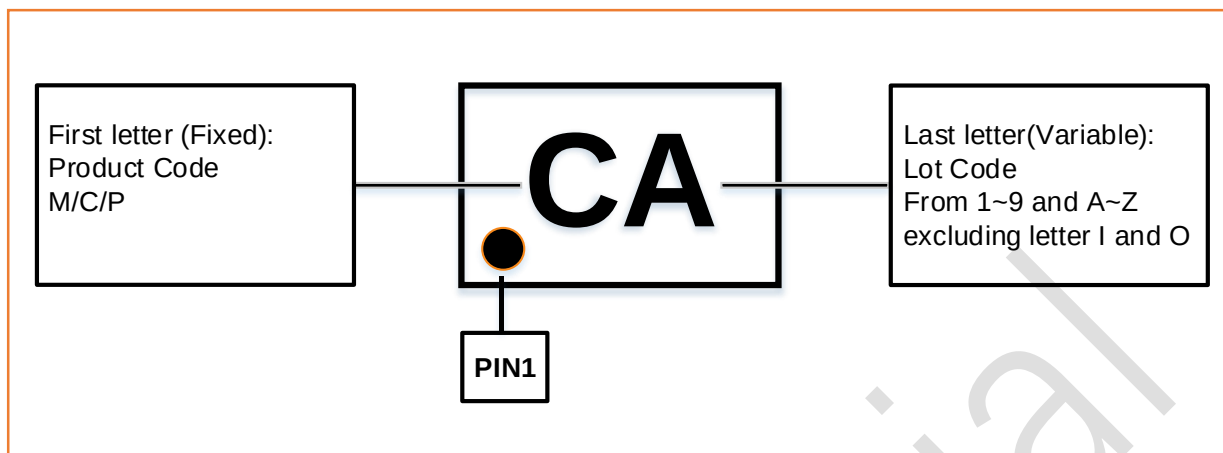


Figure 5 Marking Specification (Top View)

Tape and Reel Dimensions

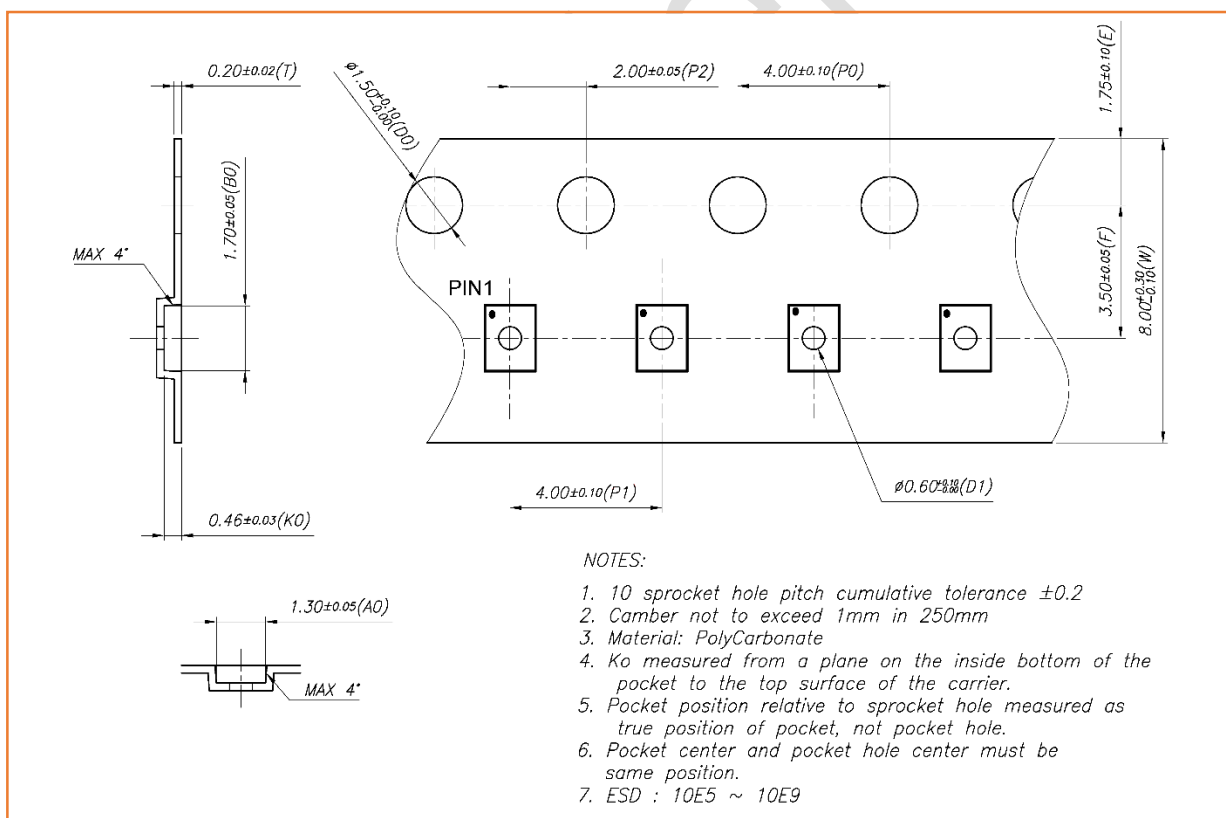


Figure 6 Tape and Reel Dimensions

Reflow Chart

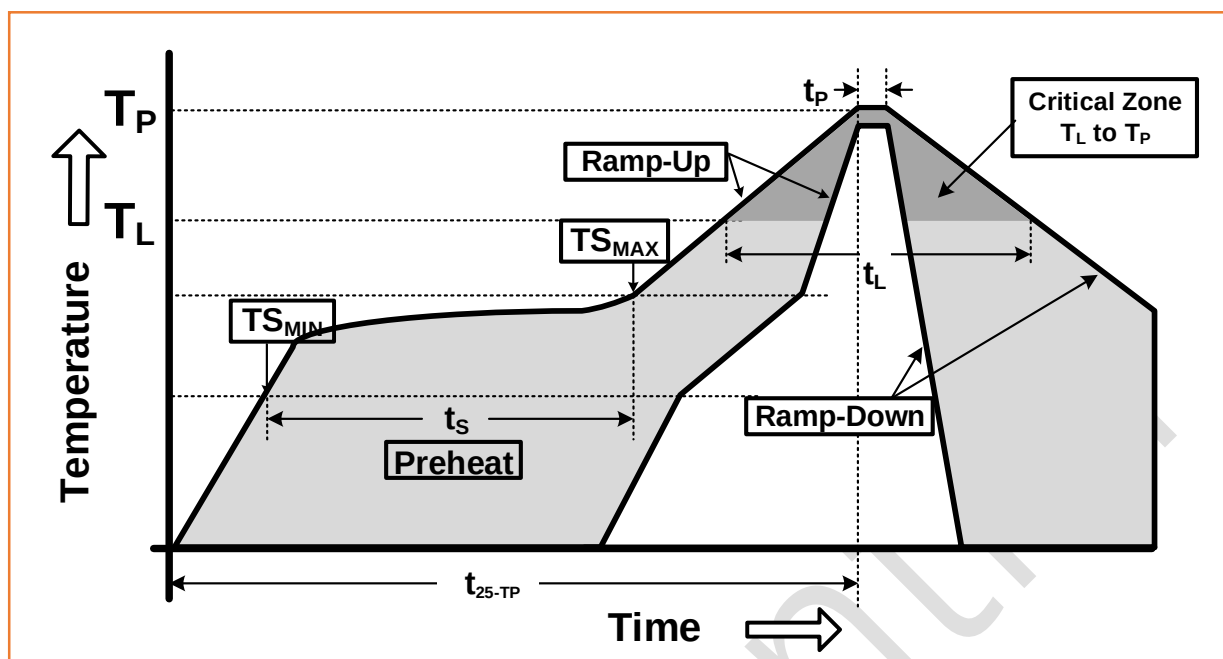


Figure 7 Recommended Lead-Free Reflow Profile

Table 8 Reflow Chart Parameters

Reflow Profile	Parameter
Preheat Temperature(TS_{MIN} to TS_{MAX})	150°C to 200°C
Preheat Time(t_s)	60 to 180 Seconds
Ramp-Up Rate(TS_{MAX} to T_P)	3°C/s MAX
Time Above T_L 217°C(t_L)	60 to 150 Seconds
Peak Temperature (T_P)	260°C
Time within 5°C of Peak Temperature(t_p)	20 to 40 Seconds
Ramp-Down Rate(TS_{MAX} to T_P)	6°C/s MAX
Time for 25°C to Peak Temperature(t_{25-TP})	8 Minutes MAX

ESD Sensitivity

Integrated circuits are ESD sensitive and can be damaged by static electric charge. Proper ESD protection techniques should be applied when devices are operated.

RoHS Compliant

This product does not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE), and are considered RoHS compliant.