MPS4101-012S & MPS4102-013S
CONTROL DEVICE
MONOLITHIC SPST PIN
RoHS Compliant

GENERAL DESCRIPTION

The MPS4101-012S and MPS4102-013S are a single chip silicon monolithic series/shunt element. The parasitic inductance is minimized in this design resulting in wide band, low loss, high isolation performance.
The back metallization on the monolithic chip is designed to be used with normal solder or epoxy die attach methods.
Only pad bonds are needed to mount the monolithic device.
This product meets RoHS requirements per EU Directive 2002/95/EC.
The standard terminal finish is gold unless otherwise specified. Consult the factory if you have special requirements.

APPLICATIONS

This shunt/series monolithic switching element provides optimum insertion loss and isolation characteristics up to 40GHz. It replaces the conventional shunt mounted chip and series mounted beam lead pin diode normally used in the manufacture of broadband microwave switches.
The large bonding pads facilitate ease of installation and high production yield with little danger of device degradation at assembly due to bonding trauma. Additionally, power handling ability is enhanced by the superior heat conduction path inherent in the series part of the element.

KEY FEATURES

- Monolithic SPST PIN switch element
- Wide Band (0.05- 40 GHz)
- Low Insertion Loss
- <1.0dB at 18GHz
- <1.5dB at 36GHz
- High Isolation
- >35dB at 18GHz
- >25dB at 36GHz
- 3W CW power handling
- Hermetic Structure
- Rugged Silicon Monolithic Design
- Fast Switching (5 nSec Typical)
- 0.02 pF Typical Series Junction
- 0.10 pF Typical Shunt Junction
- RoHS Compliant

APPLICATION/BENEFITS

- 0.05 – 40 GHz Switching
- Improved Power Handling
- High Reliability

ABSOLUTE MAXIMUM RATINGS @ 25°C

Rating	Symbol	Value	Unit
Minimum Rated Breakdown Voltage	V_B	80	V
Storage Temperature	T_{ST}	-65 to +200	°C
Operating Temperature	T_{OP}	-55 to +150	°C
CW RF Operating Power	P_{CW}	3	W
Forward DC Current	I_F	100	mA
Reverse DC Voltage	V_R	100	V

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DEVICE ELECTRICAL PARAMETERS AT 25°C

ELEMENT	V_b (V) I_R=10µA (Min)	C_T (pF) @50V (Typ)	R_s (Ω) I_F=100mA F=1.0GHz (Max)	T_L(nS) (Typ)	V_F (V) I_F=10 mA (Typ)	THERMAL RESISTANCE (°C/W) (Typ)
SERIES ELEMENT	80	0.02	2.5	40	1.05	70
SHUNT ELEMENT	80	0.10	0.8	60	0.85	20

Parameter	Conditions	Specification
INSERTION LOSS	50MHz – 10GHz	0.6 dB MAX
	50MHz – 18GHz	0.8 dB MAX
	50MHz – 26GHz	1.1 dB MAX
	50MHz – 36GHz	1.5 dB MAX
	50MHz – 40GHz	2.3 dB MAX
RETURN LOSS	50MHz – 10GHz	20 dB MAX
	50MHz – 18GHz	16 dB MAX
	50MHz – 36GHz	14 dB MAX
	50MHz – 40GHz	9 dB MAX
ISOLATION	50MHz – 10GHz	40 dB MAX
	50MHz – 18GHz	38 dB MAX
	50MHz – 26GHz	31 dB MAX
	50MHz – 36GHz	26 dB MAX
	50MHz – 40GHz	23 dB MAX
1.0 dB COMPRESSION POINT	50MHz – 40GHz	+33 dB MIN
RISE TIME	10% - 90% RF	20 nsec MAX
FALL TIME	90% - 10% RF	5 nsec MAX
IOP3		+62 dBm MIN
IOP2		+83 dBm MIN

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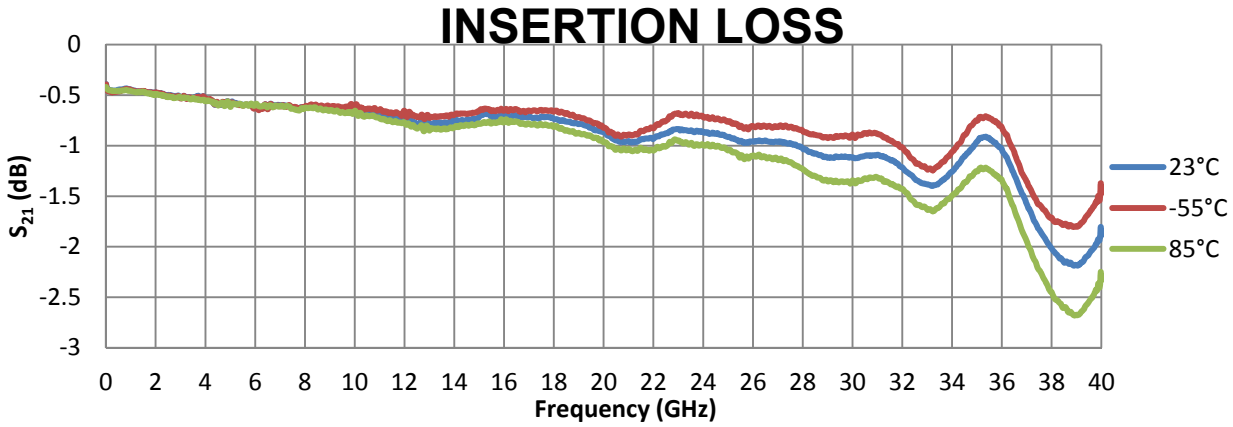

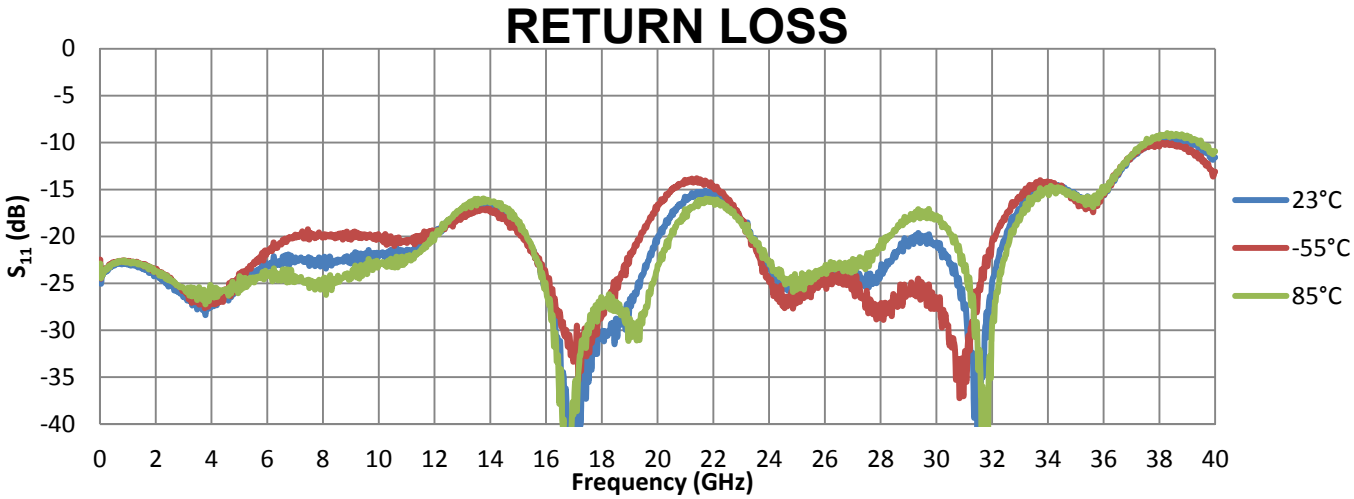

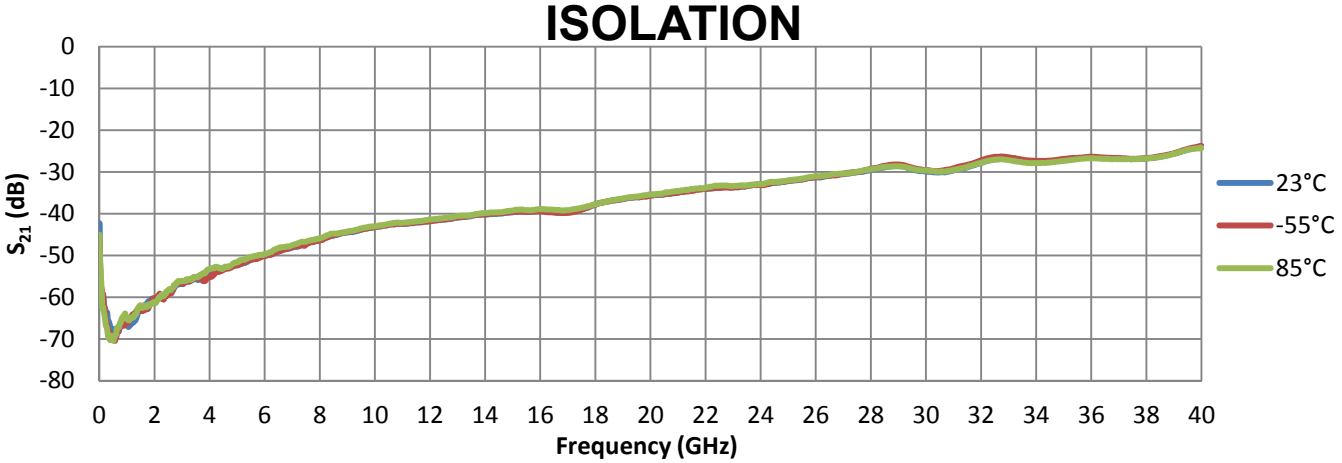

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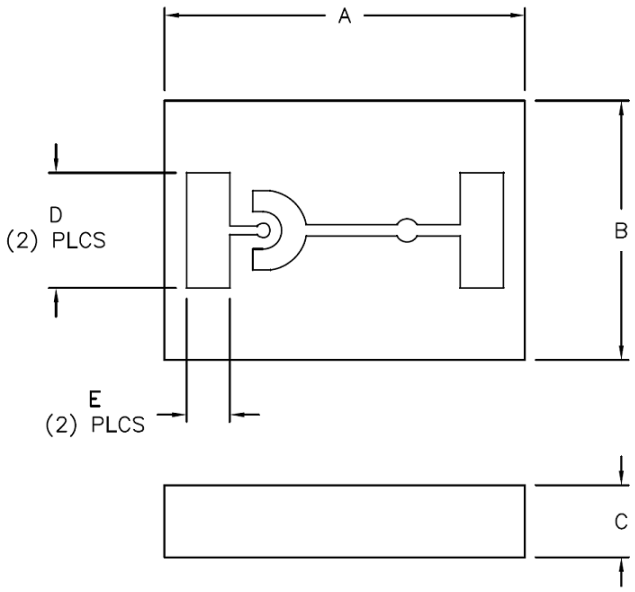
PACKAGE OUTLINE 012S



DIM	INCHES			MM		
	MIN	TYP	MAX	MIN	TYP	MAX
A	0.023	0.025	0.027	0.584	0.635	0.686
B	0.016	0.018	0.020	0.406	0.457	0.508
C	0.004	0.005	0.008	0.102	0.127	0.203
D	0.007	0.008	0.009	0.178	0.203	0.229
E	0.002	0.003	0.004	0.051	0.076	0.102

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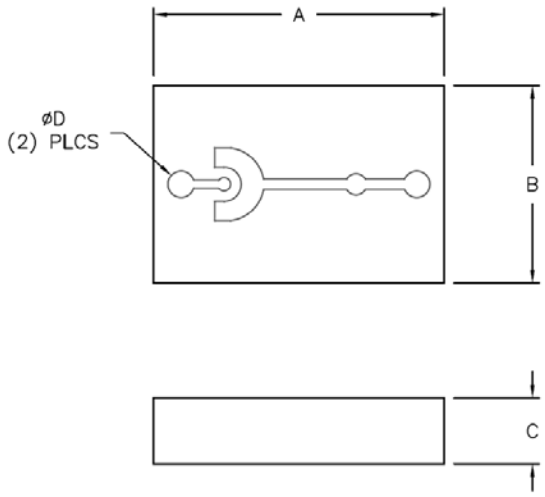
PACKAGE OUTLINE 013S



DIM	INCHES			MM		
	MIN	TYP	MAX	MIN	TYP	MAX
A	0.021	0.022	0.023	0.533	0.559	0.584
B	0.014	0.015	0.016	0.356	0.381	0.406
C	–	0.005	–	–	0.279	–
D	0.00200	0.00225	0.00250	0.05080	0.05715	0.06350

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HANDLING AND INSTALLATION RECOMMENDATIONS

DIE HANDLING

Die should be handled by vacuum pickup tools or special die bonding collets to prevent damage to the chip from handling. Tweezers can be used, but this method will require a very experienced operator to prevent damage to the die from the tweezers. The metallization scheme of our diodes allows the die-attach to be performed as high as 450°C.

MOUNTING

Die can be attached to the package using a substantial number of solders and conductive silver-filled epoxies. Consult the factory for advice in case of difficulty.

WIRE/RIBBON BONDING

Wire/ribbon bonding can be accomplished using either thermocompression or thermosonic techniques. Ultrasonic bonding can be used at room temperature but is not recommended. Pure gold wire is recommended over aluminum wire. Consult the factory for advice in case of difficulty.

CIRCUIT CONSIDERATIONS

5-to 7-mil thick 50ohm microstrip transmission lines are recommended for optimum performance. Thicker substrates can be used but the die must be installed on a conductive shim in order to maintain top surface planarity with respect to the transmission line surface. The gap between die and substrate must be kept to a minimum, typically 2 – 3mils maximum.

ELECTROSTATIC DISCHARGE

Follow all ESD precautions and procedures when handling device.

Revision History

Revision Level / Date	Para. Affected	Description
1 / 31 December 2014	-	Initial Release