MP228

SPDT switch, reflective

- frequency range DC…50 GHz
- insertion loss < 4 dB
- high isolation > 45 dB
- input return loss −3 dB
- output return loss −10 dB
- RF max power input P_{IN} = +30 dBm

Application

- test and measurement equipment
- communications
- radars

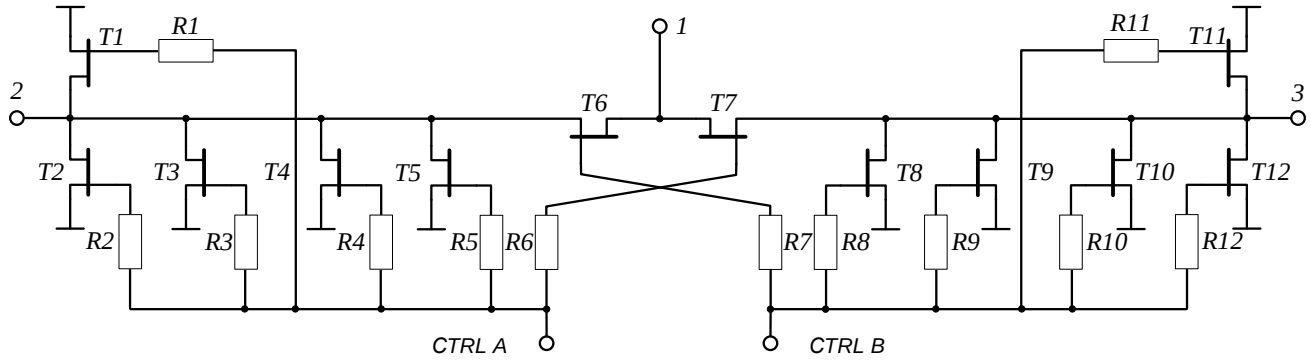
MP228 is a GaAs MMIC ultra-wideband Single-Pole Double-Throw (SPDT) switch based on 0.5 µm gate length pHEMT process.

Electrical specifications (T = 25 °C)

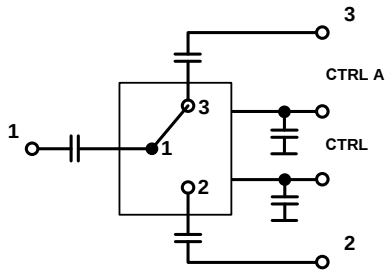
Symbol	Parameter	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Unit
ΔF	Frequency range		DC…10			10…25			25…50		GHz
TL	Transmission Loss	2.1	2.2	2.5	—	2.7	3	3.2	3.5	4	dB
ISO_{LO-RF}	LO to RF Isolation	—	50	—	—	45	—	—	45	—	dB
RL (S11)	Return loss	—	−14	—	—	−15	—	—	−15	—	dB
RL (S22, S33)	Return loss	—	−14	—	—	−12	—	—	−10	—	dB
IIP3	Input IP3	—	+36	—	—	+35	—	—	TBD	—	dBm
P1*	Input power for 1 dB compression	+7	+29	—	—	+29	—	—	+29	—	dBm
P_{MAX}	RF max power input					+30					dBm

REMARK *In frequency ranges below 1 GHz, the 1 dB compression at the input does not exceed +7 dBm, due to the peculiarity of the pHEMT transistors.

Schematic circuit



Application circuit

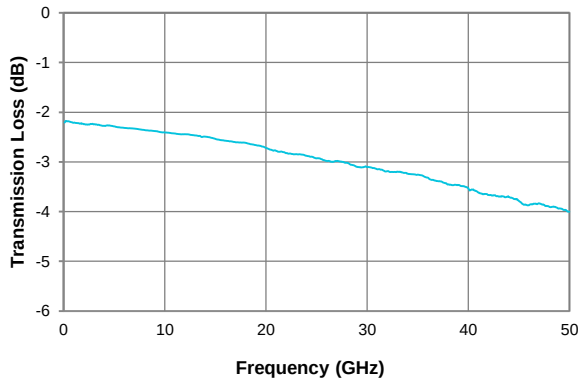


Switch control table:

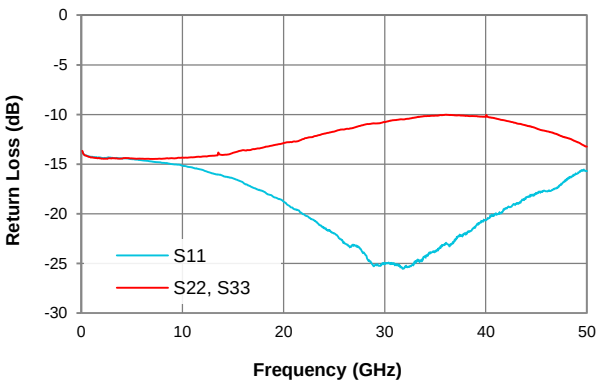
Control input		Signal path state	
CTRL A	CTRL B	1 – 2	1 – 3
-5 V	0	On	Off
0	-5 V	Off	On

Typical characteristics (T = 25 °C)

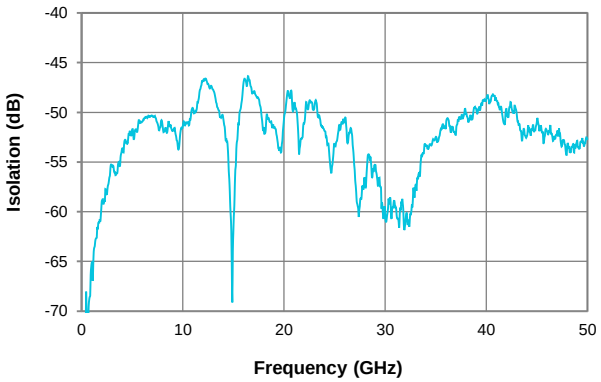
Transmission Loss (1 to 2,3 in ON state)



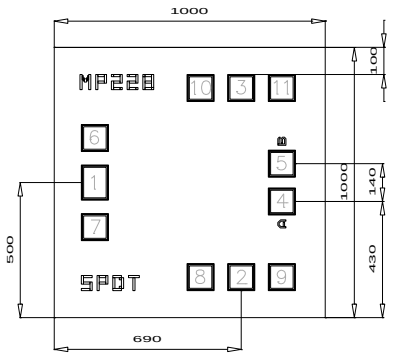
Return Loss



Isolation (1 to 2,3 in OFF state)



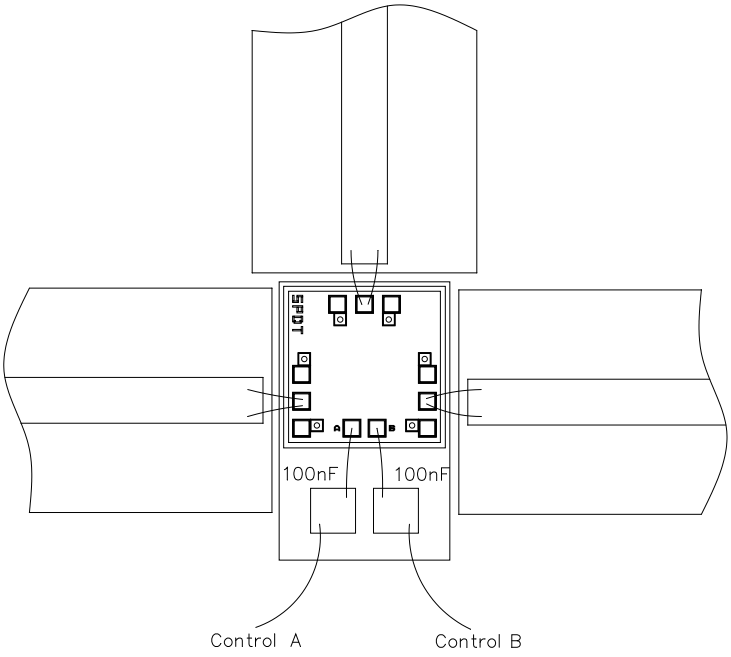
Mechanical data



- Chip size 1000 × 1000 µm (before wafer dicing), thickness 100 µm;
- Bond pad dimensions are shown to centre of bond pad;
- Bond pad and backside metallization: gold;
- RF pads are 100 × 100 µm.

Pad number	Port	Description
1	RFC	Common RF port
2	RF1	RF output
3	RF2	RF output
4	A	CTRL
5	B	CTRL
6	—	GND
7	—	GND
8	—	GND
9	—	GND
10	—	GND
11	—	GND

Assembly diagram



Application notes

Mounting
The chip is back-metallized and can be die mounted with AuSn eutectic preforms or with electrically conductive epoxy. The mounting surface should be clean and flat. 50 Ohm microstrip transmission lines on 0.127mm thick alumina thin film substrates are recommended for bringing RF to and from the chip (Figure 1). One way to accomplish this is to attach the 0.102mm thick die to a 0.150mm thick molybdenum heat spreader (molytab) which is then attached to the ground plane (Figure 2). Microstrip substrates should be located as close to the die as possible in order to minimize bond wire length. Typical die-to-substrate spacing is 0.1mm.

Wire Bonding
A recommendation for RF pads (1, 2, 3) is one wire: diameter 25 µm, length 300 µm.

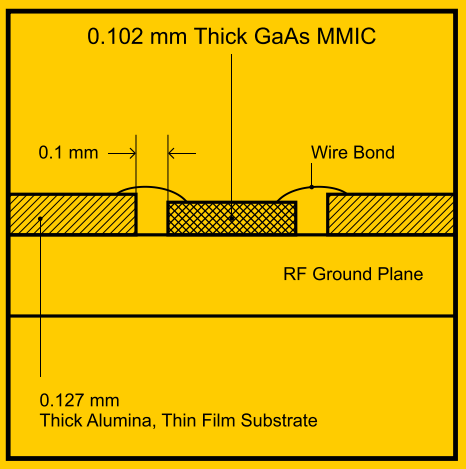


Figure 1.

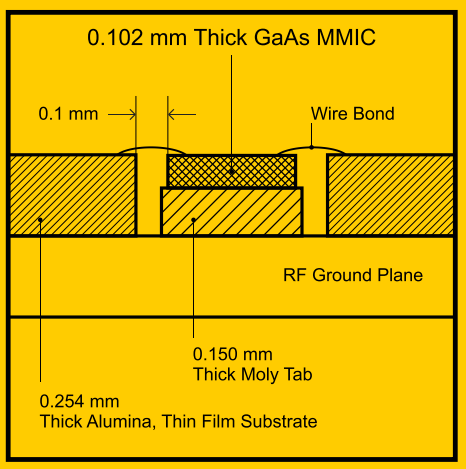


Figure 2.

Recommended ESD Management

This device is susceptible to electrostatic and mechanical damage. Dies are supplied in antistatic containers, which should be opened in cleanroom conditions at an appropriately grounded antistatic workstation. Devices need careful handling using correctly designed collets, vacuum pickups or, with care, sharp tweezers.