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PRELIMINARY

SPDT MEMS DKM812-3 SWITCH 6.0 GHz

DESCRIPTION

The DKM812 is a Single Pole Double-Throw (SPDT) Reflective RF switch that utilizes breakthrough MEMS technology to provide extremely low insertion loss, high linearity, and high isolation in a compact hermetic chip-scale package.

This switch is ideally suited for use in automated test equipment, instrumentation, wireless handsets, wireless LANs, global positioning receivers, broadband wireless access, and other applications where low insertion loss, high linearity, and high isolation are critical. The performance advantages of the DKM812 over GaAs switches enable realization of high-performance multi-mode / multi-band devices.

The DKM812 is specified for operation to 6GHz and is packaged in a compact (7mm x 7mm x 1.5mm) package with an industry-standard footprint (JEDEC MO-220).

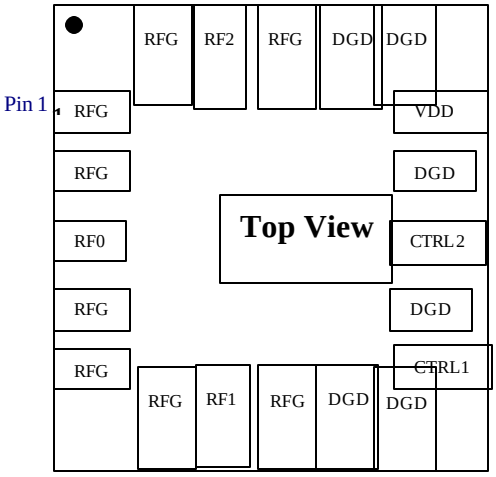
FEATURES

- **Small size: 7mm x 7mm x 1.5mm**
- **Low-loss:**
  - **< 0.15 dB @ 1 GHz**
  - **< 0.30 dB @ 6 GHz**
- **High linearity: IP3 > 65 dBm**
- **High isolation: 30dB @ 1GHz**
- **Low power consumption: 3mW**
- **Wide frequency range: DC to 6 GHz**

APPLICATIONS

- **Automated test**
- **Instrumentation**
- **Smart Antenna / Antenna diversity**
- **Multi-band / multi-mode**
- **Cellular / wireless handsets**
- **General RF switching**

PACKAGE PIN-OUT



PIN DESCRIPTIONS

Pin Label	Pin Number	Description
RFG	1,2,4,5,6, 8,18,20	RF Ground
RF0	3	RF Common
RF1	7	RF In/Out 1
DGD	9,10,12,1 4,16,17	Digital Ground
CTRL1	11	Control Voltage for RF1
CTRL2	13	Control Voltage for RF2
VDD	15	Supply voltage
RF2	19	RF In/Out 2

LOGIC TABLE

SWITCH STATE	CTRL1	CTRL2
RF0 to RF1	High	Low
RF0 to RF2	Low	High

ORDERING GUIDE

Part Number	Operating Temperature Range	Supply &Control Voltage s	Package Description
DKM812-3	-40°C to + 85°	2.7-5.5 V	MO-220

DKM812-3 SPECIFICATIONS (T_A=25°C unless otherwise noted)

Parameter	Test Conditions	Minimum	Typical	Maximum	Units
Insertion Loss RF0 to RF1 (or RF2)	< 1.0 GHz		0.15	0.20	dB
	1.0 – 2.5 GHz		0.20	0.30	dB
	2.5 – 3.5 GHz		0.23	0.30	dB
	3.5 – 5.0 GHz		0.26	0.35	dB
	5.0 – 6.0 GHz		0.28	0.40	dB
Isolation (RF0 to open switch) (Opposite switch closed and terminated into 50 ohms.)	< 1.0 GHz	28	30		dB
	1.0 – 2.5 GHz	22	24		dB
	2.5 – 3.5 GHz	21	22		dB
	3.5 – 5.0 GHz	20	21		dB
	5.0 – 6.0 GHz	21	22		dB
Isolation (RF1 to RF2, with RF0 terminated into 50 ohms)	100kHz - 6.0 GHz	25			dB
Return Loss	100 kHz - 6.0 GHz	14			dB
Input IP_3	Two-tone inputs 900 MHz and 901MHz up to +5 dBm	65			dBm
Output P1dB	2.4 GHz	Tested to 37 dBm with no compression found.			dBm
Max. Power Input (cw)	▪ 100kHz – 6 GHz: Z_L = 50 ohms, (see Notes 1 & 3) ▪ DC-100kHz: (See Note 5)			2 Watts 5V/100mA	
Switching Speed					
Ton	Control signal to 90% RF		70	100	µs
Toff	Control signal to 10% RF		10	50	µs
Trise	10 % to 90 % RF		< 5	5	µs
TFall	90% to 10 % RF		< 5	5	µs
Supply voltage (VDD)		2.7		5.5	V
Supply current (IDD)				1	mA
CTRL1 or CTRL2 Logic "0"		0		1	V
CTRL1 or CTRL2 Logic "1"		2.7		VDD	V
CTRL current				2	µA

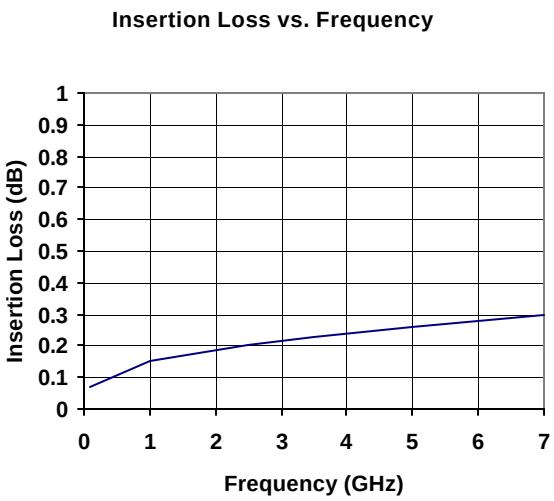
ABSOLUTE MAXIMUM RATINGS

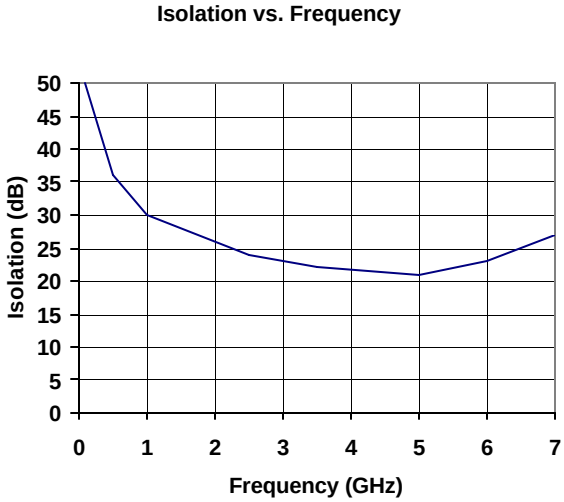
Peak RF Power (see Notes 1, 3 & 4)	3 W
Lead Temperature, Soldering (120 sec)	+220°C
Storage temperature	-40°C to + 85°C

Notes:

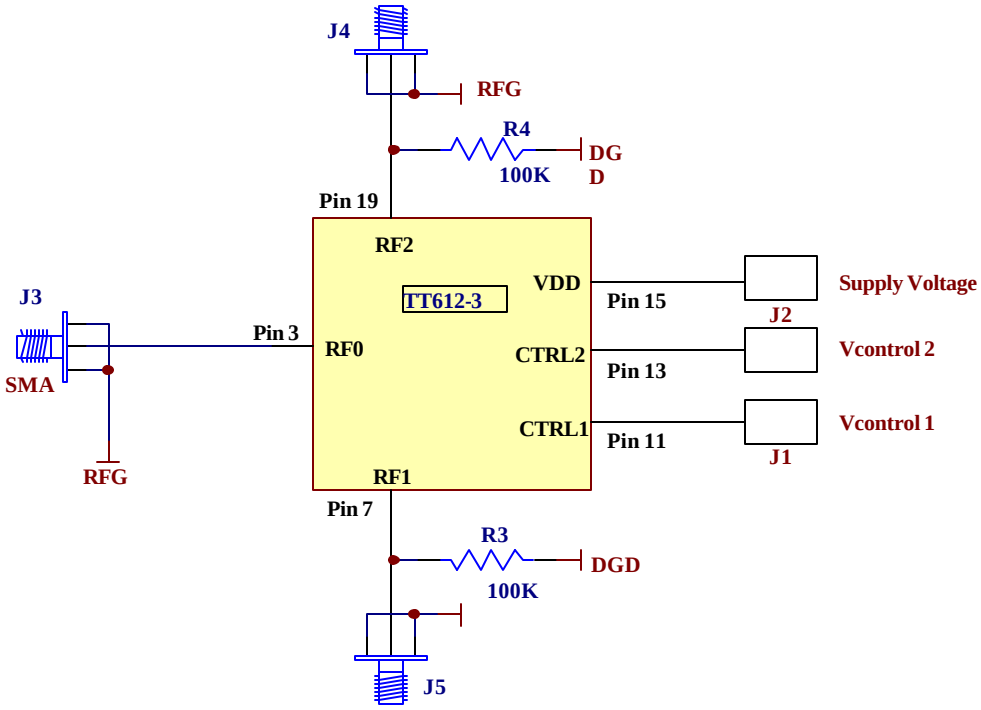
1) Data sheet performance specifications and switch operation are for cold switching only: Hot switching may reduce the switch lifetime.
2) DC gate control voltages CNTRL1/ CNTRL2 referenced to RF1/RF2 respectively.
3) The maximum operating temperature has to be derated by 15°C/W with a maximum of 2W (cw)
4) Peak RF power shall not be applied continuously for more than 1 minute.
5) DC and low frequency signals large than 5V/100mA may reduce the reliability of the switch.

TYPICAL PERFORMANCE DATA





EVALUATION CIRCUIT



Notes:

6) The switch requires a dc path between RF1 and RF2 to control ground in order to function properly. Bias resistors (R3 and R4) on the RF output lines can be omitted as long as the RF outputs (J3, J4) are connected to resistive loads. Care needs to be taken not to apply excessive DC and low frequency signals, as they may affect the reliability of the switch. In case DC blocking capacitors are used on RF1 and RF2, the bias resistors are required.

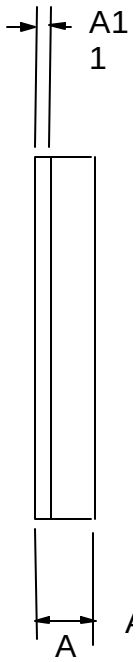
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

PACKAGE DIMENSIONS

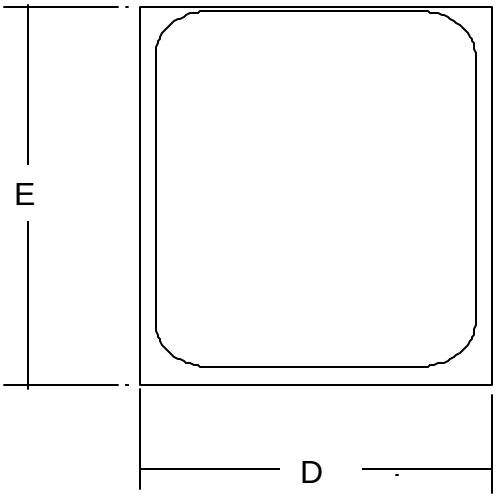
JEDEC MO-220 Package

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.4	1.6	0.056	0.064
A1	0.15	0.25	0.006	0.010
B	0.3	0.5	0.012	0.020
D	6.9	7.1	0.276	0.284
E	6.9	7.1	0.276	0.284
e	1.0		0.040	
L1	.35	.45	0.014	0.018

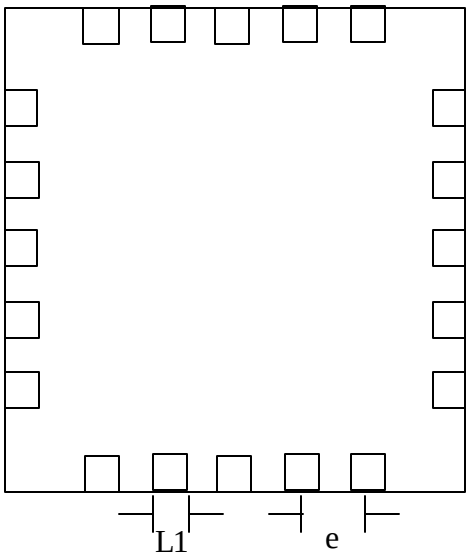
SIDE VIEW



TOP VIEW



BOTTOM VIEW



TOP VIEW

PACKAGE PIN OUT