TOWARD RELAYS

DC to 16GHz Single-Pole Four Throw RF MEMS Switch

M4AG

Applications

- Switched Filter Banks and Tunable Filters
- High Power RF Front-Ends
- Low-Loss Switch Matrices
- RF EM Relay Replacement
- Antenna Tuning
- Antenna Beam Steering
- Digital Step Attenuators

Markets

- Defense and Aerospace
- Test and Measurement
- Wireless Infrastructure

Features:

- DC to 16 GHz Frequency Range
- SP4T
- 9 W (CW), 100 W (Pulsed) Max Power Handling
- Low On-State Insertion Loss: 3 dB @ 16 GHz
- High Linearity, IP3 > 95 dBm
- 20 dB Isolation @ 16 GHz
- High Reliability > 3 Billion Switching Operations
- 5.8mm*5.8mm*1.9mm SMT Package
- 2000V ESD Protection (HBM)

The product images shown may not be an exact representation of the product.

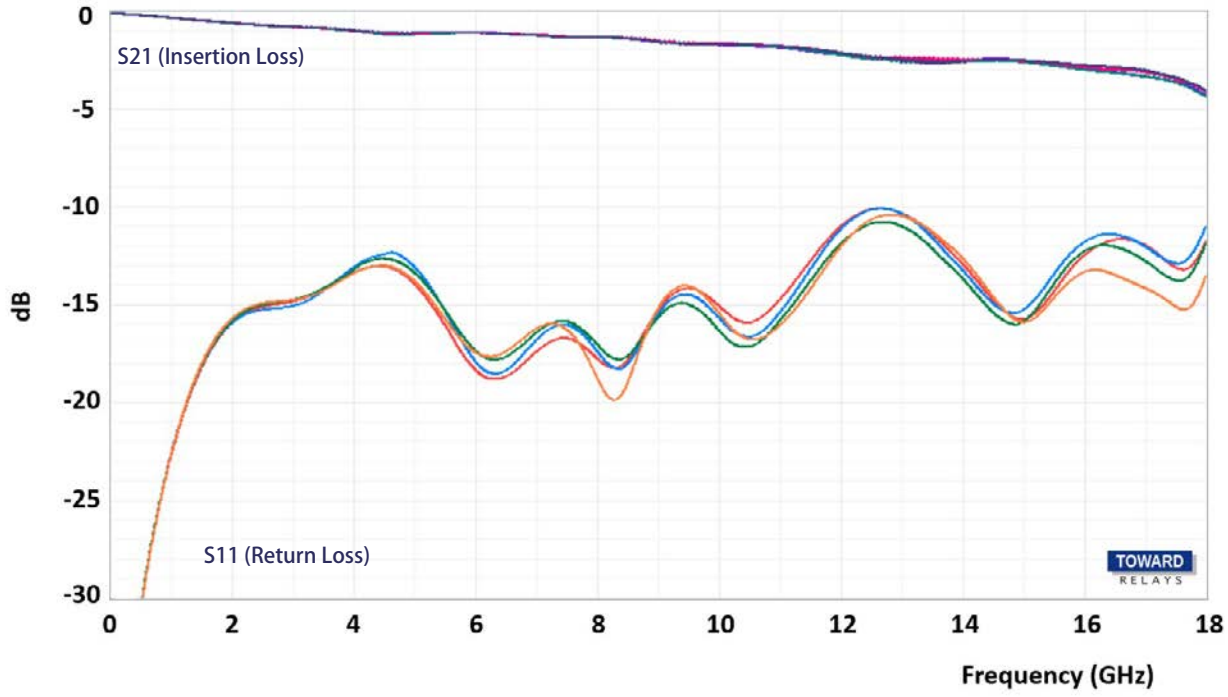
Ratings

Parameter	Minimum	Maximum	Unit
Total CW Input Power / Switch		9	W
Open State Voltage Rating / Switch RF1-4 to RFC		+/-150	V
Open State Voltage RF1-RF4, RFC to GND, GATE pin to GND Potential		+/-150	V
DC Voltage RFGATE Pins to RF1-RF4, RFC, GND		+/-100	V
DC Current Rating / Switch		500	mA
Hot Switching Current @ 0.5 V		10	mA
Operating Temperature Range	-40	+85	°C
Storage Temperature Range	-65	+140	°C

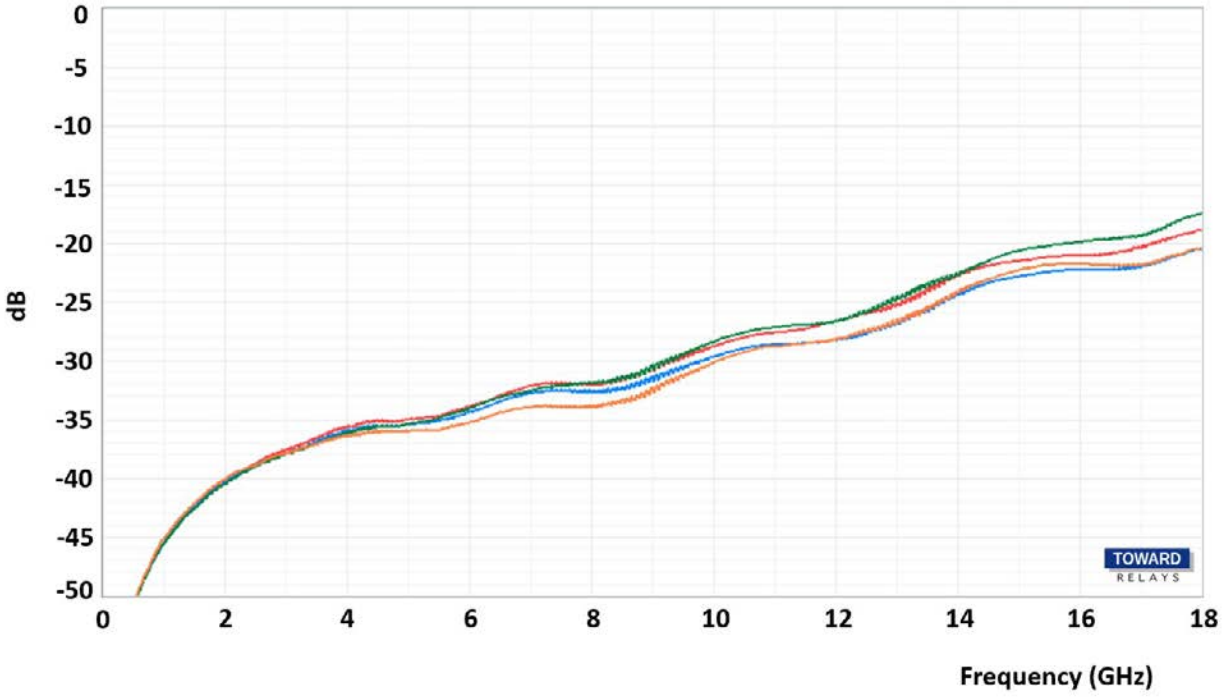
Recommended Operating Conditions

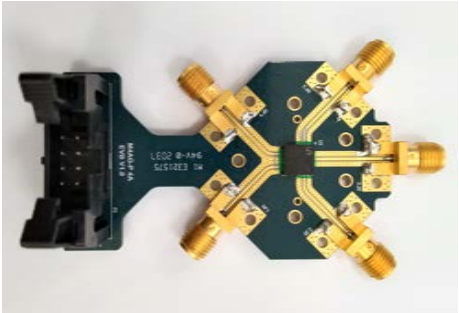
Parameter	Minimum	Typical	Maximum	Unit
Operating Frequency Range	DC		16	GHz
CW Power / Channel @ 1 GHz			9	W
Peak Power / Channel @ 10% DC			60	W
Operating Temperature Range	-40		+85	°C
Insertion Loss @ 6 GHz		1.0		dB
Insertion Loss @ 16 GHz		3		dB
Input / Output Return Loss @ 6GHz		15		dB
Input / Output Return Loss @ 16GHz		10		dB
Isolation @ 6 GHz		30		dB
Isolation @ 16 GHz		20		dB
Channel to Channel Isolation @ 6 GHz		30		dB
Third-Order Intercept Point (IP3)		> 95		dBm
Second Harmonic, 30 dBm, 1800 MHz		-130		dBc
Third Harmonic, 30 dBm, 1800 MHz		-130		dBc
On / Off Switching Time		8	10	μsec
Full Cycle Frequency			10	kHz
On / Off Switch Operations	$1*10^9$			Cycles
DC Steady State Carry Current		500		mA
Off-State RFC to RFOUT Leakage Current @		5		nA
On-State Resistancce (R_{On})		1.0		Ω
Off-State Capacitance (C_{off})		15		fF
Video Feedthrough		16		mV_{peak}
Gate Bias Voltage (VBB)	88	89	90	V_{DC}
Gate Bias Current			300	nA
ESD Voltage RF In/Out Pad		2000		V

S-Parameters



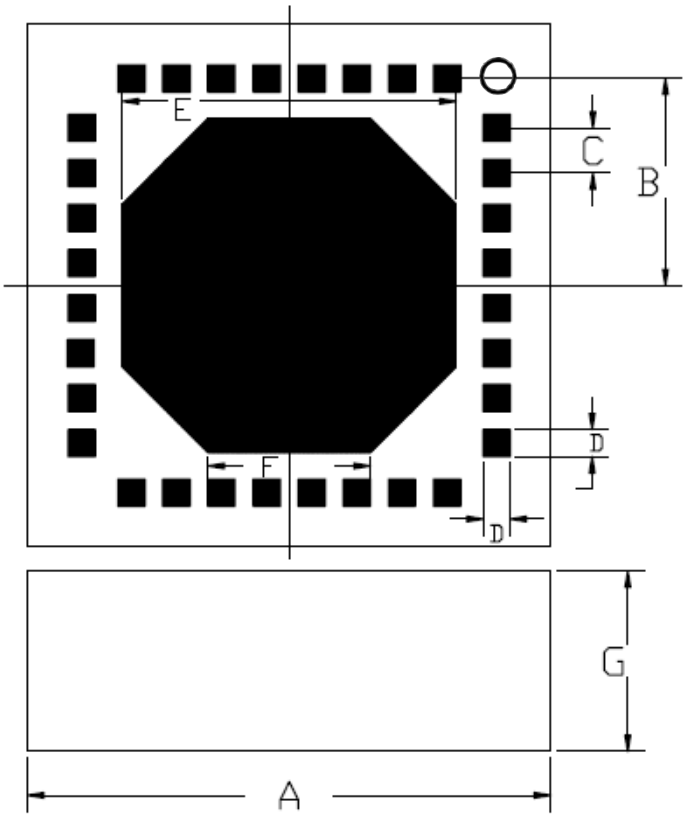
Isolation





Typical Device Performance Measured on Evaluation Board

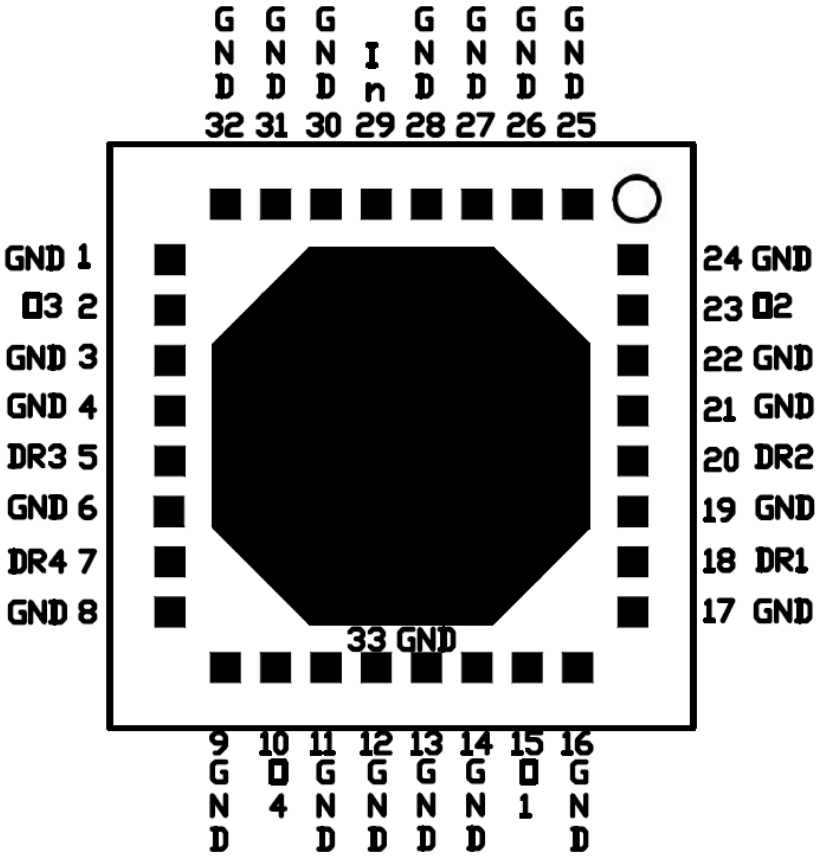
Dimensions



TOP VIEW

DIMENSIONS	MAXIMUM	TYPICAL	MINIMUM
A	5.9 mm	5.8 mm	5.7 mm
B		2.3 mm	
C		0.5 mm	
D	0.35 mm	0.3 mm	0.25 mm
E		3.7 mm	
F		1.8 mm	
G	2.0 mm	1.9 mm	1.8 mm

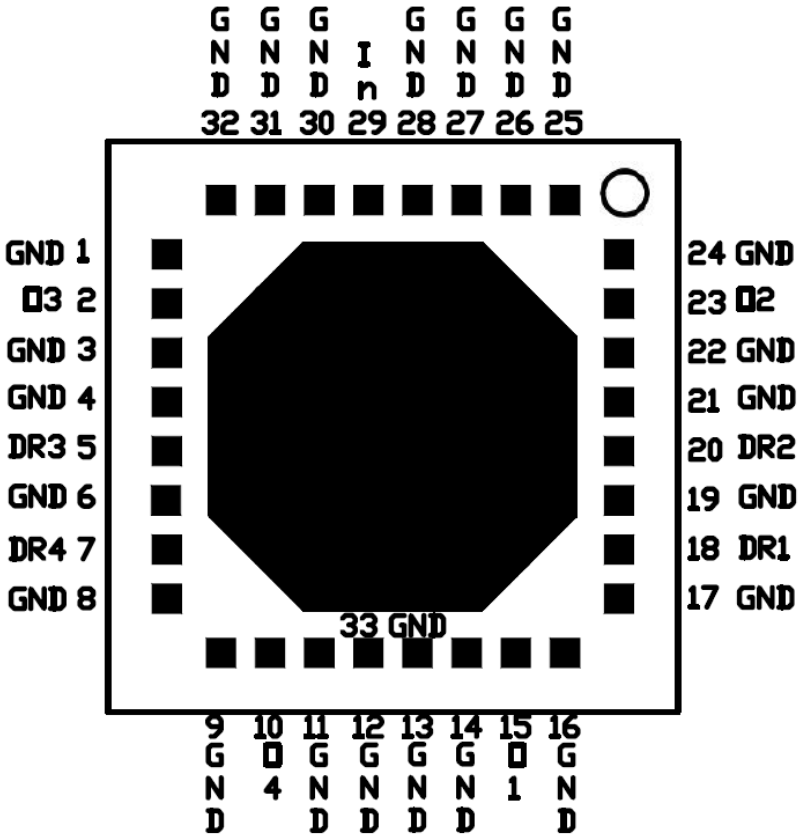
Pin-out Information



TOP VIEW

PIN #	FUNCTION	DESCRIPTION
1, 3, 4, 6, 8, 9, 11, 12, 13, 14,16, 17,19, 21, 22, 24, 25, 26, 27, 28, 30, 31, 32, 33	GND	RF GROUND
5	DR3	90V Driver 3
7	DR4	90V Driver 4
10	O4	RF Output 4
15	O1	RF Output 1
18	DR1	90V Driver 1
20	DR2	90V Driver 2
23	O2	RF Output 2
29	In	RF Input
2	O3	RF Output 3

Applied Gate Voltage vs. RF Switch States (ON = Closed; OFF = Open)



TOP VIEW

Input Power				In - Output ON/OFF			
DR1(V)	DR2(V)	DR3(V)	DR4(V)	O1	O2	O3	O4
SP4T Normal Mode							
0	0	0	**VBB**	OFF	OFF	OFF	**ON**
0	0	**VBB**	0	OFF	OFF	**ON**	OFF
0	**VBB**	0	0	OFF	**ON**	OFF	OFF
VBB	0	0	0	**ON**	OFF	OFF	OFF