TGS2353-2-SM

0.5 - 18 GHz High Power SPDT Reflective Switch

Product Overview

Qorvo's TGS2353-2-SM is a single-pole, double-throw (SPDT) reflective switch packaged in a 4x4mm ceramic, air-cavity QFN.

Fabricated on Qorvo's QGaN25 0.25um GaN on SiC production process, the TGS2353-2-SM operates from 0.5-18GHz and can switch up to 10W with low insertion loss and high isolation.

The TGS2353-2-SM performance allows it to be used in a variety of applications across commercial and military markets; low and high power.

Lead-free and RoHS compliant

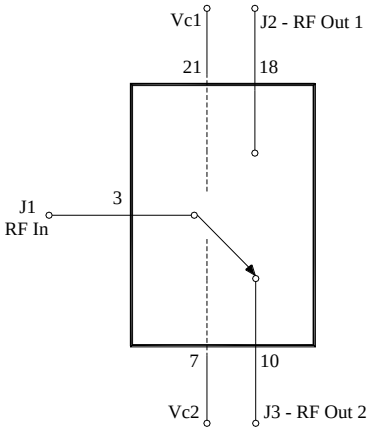
Evaluation Boards are available upon request.

QFN 4x4 mm 22L

Key Features

- SPDT, Reflective
- Frequency Range: 0.5 to 18 GHz
- Input Power: up to 10 W
- Insertion Loss: <1.5 dB
- Isolation: 30 dB Typical
- Switching Speed: <35 ns
- Control Voltages: 0 V/−40 V
- Dimensions: 4.0 x 4.0 x 1.42 mm

Functional Block Diagram



Applications

- Commercial and Military Radar
- Communications
- Electronic Warfare
- Test Instrumentation
- General Purpose

Ordering Information

Part No.	ECCN	Description
TGS2353-2–SM	EAR99	0.5–18 GHz High Power SPDT Reflective Switch

Absolute Maximum Ratings

Parameter	Rating
Control Voltage (V_C)	−50 V
Control Current (I_C)	−1.5 / 6 mA
Power Dissipation	3.5 W
RF Input Power, CW, 50 Ω, T = 25 °C	41 dBm
Channel Temperature, T_{CH}	275 °C
Mounting Temperature (30 sec)	320 °C
Storage Temperature	−40 to 150 °C

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
V_{C1}		-40/0		V
V_{C2}		0/-40		V
I_{C1} / I_{C2}		−0.25 to 0.1		mA

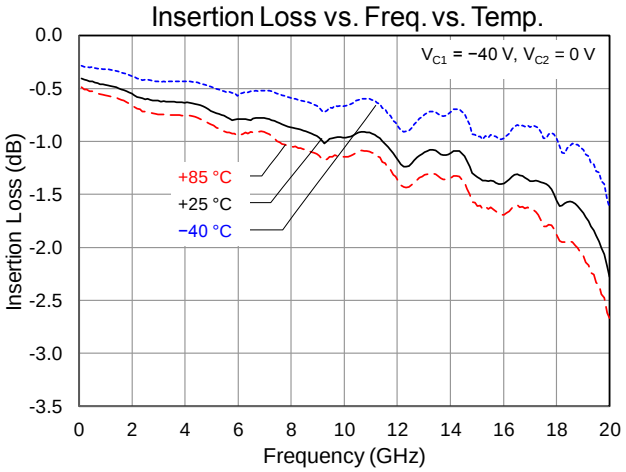
Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

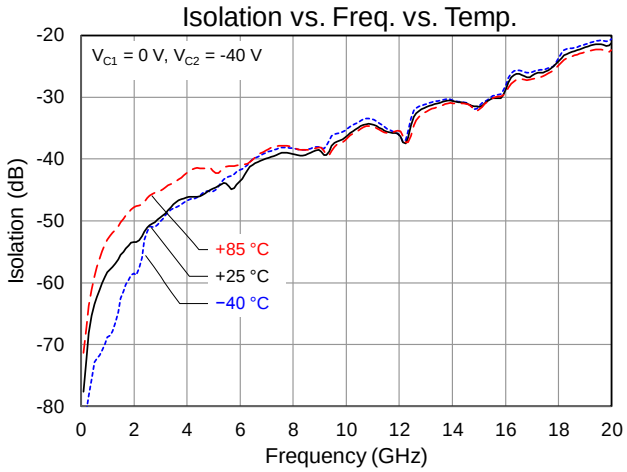
Electrical Specifications

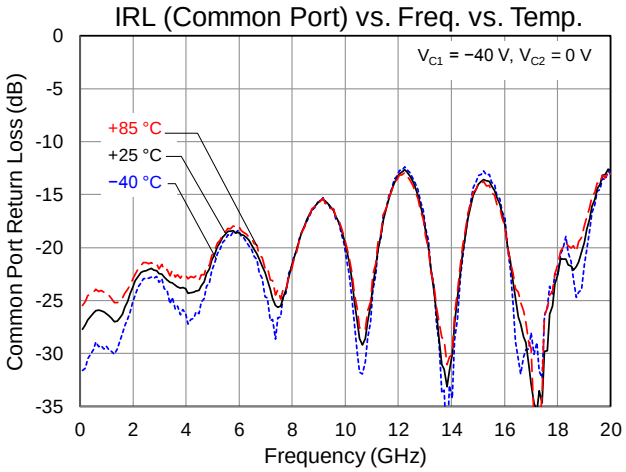
Parameter	Conditions (1)	Min	Typ	Max	Units
Operational Frequency Range		0.5		18	GHz
Insertion Loss			<1.5		dB
Input Return Loss – Common Port			15		dB
Output Return Loss – Switch Port			15		dB
Isolation			30		dB
Output Return Loss – Isolated Port			2		dB
Input Power			40		dBm
Insertion Loss Temperature Coefficient			-0.004		dB/°C
Switching Speed – On			31		ns
Switching Speed – Off			18		ns

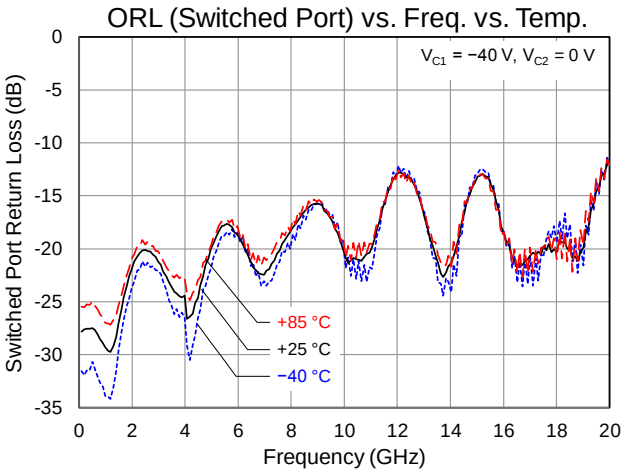
Notes:
1. Test conditions unless otherwise noted: Temp= +25°C. V_{C1} = −40/0 V, V_{C2} = 0/−40 V, see Function Table on page 7

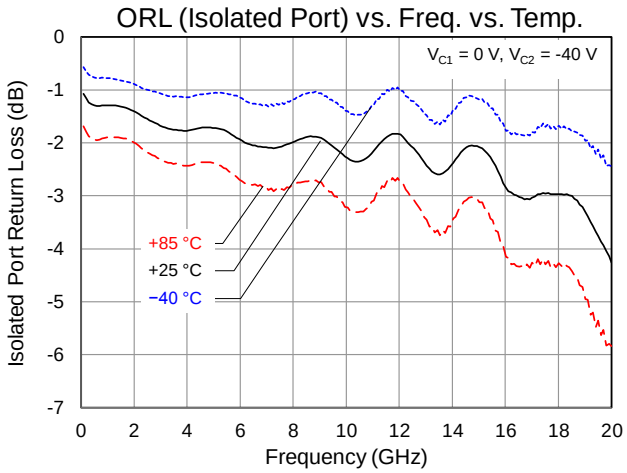
Performance Plots – Small Signal



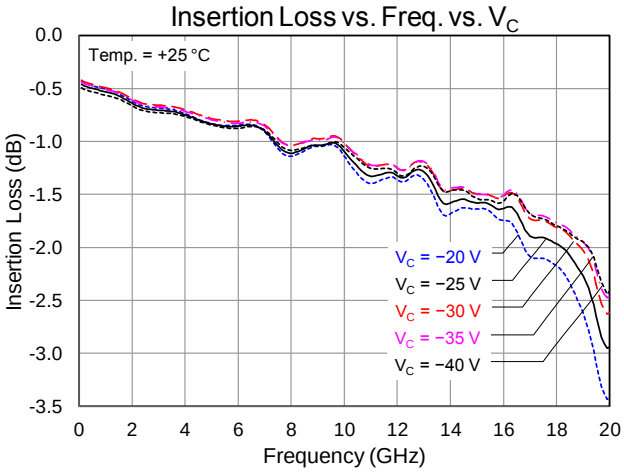


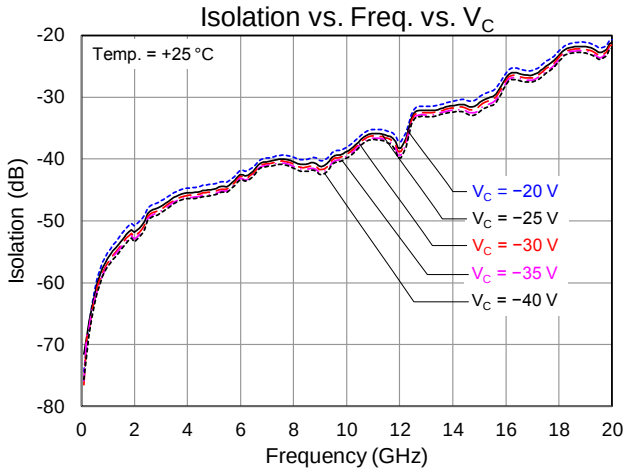


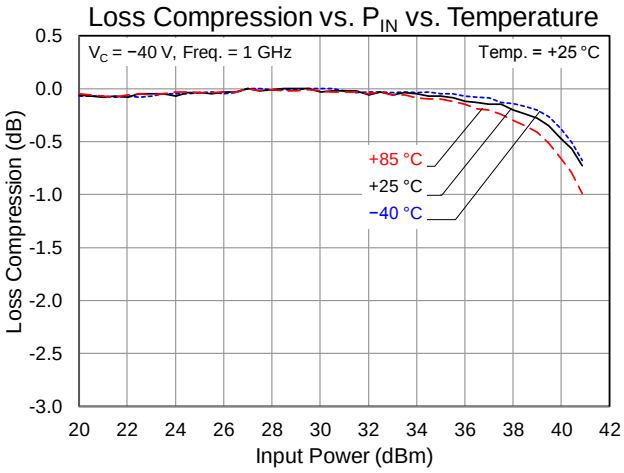


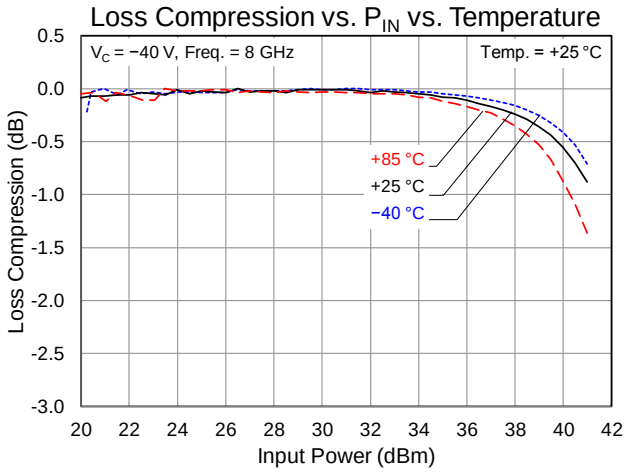


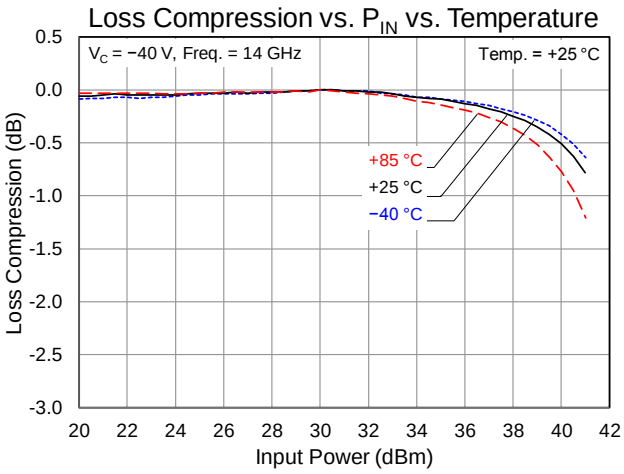
Performance Plots – Small Signal and Compression

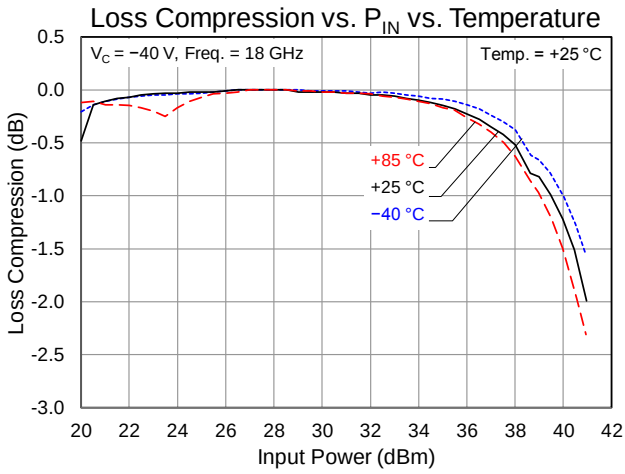




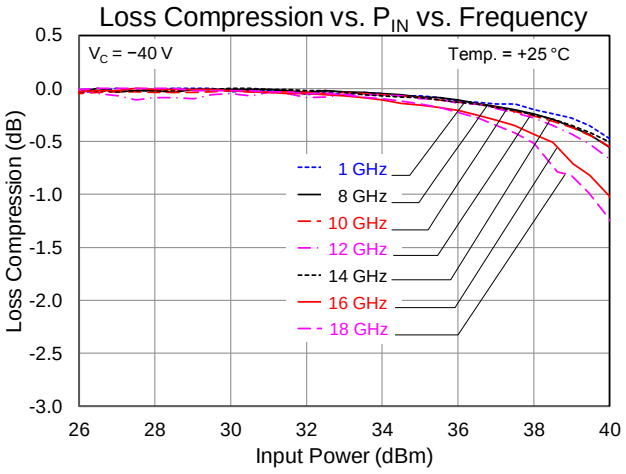


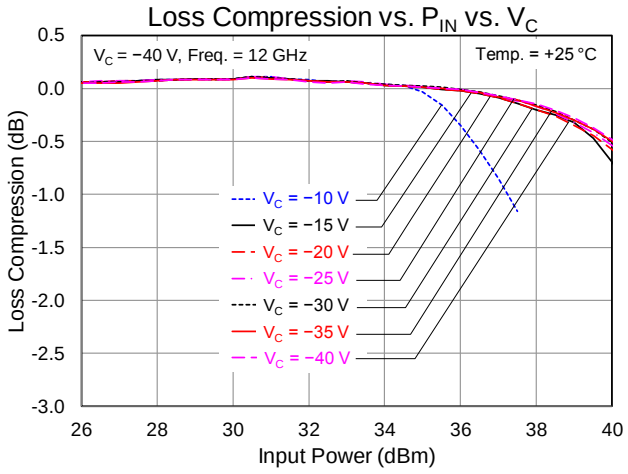


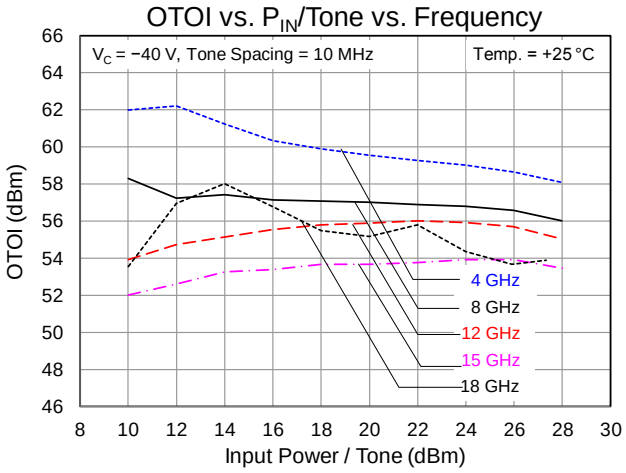


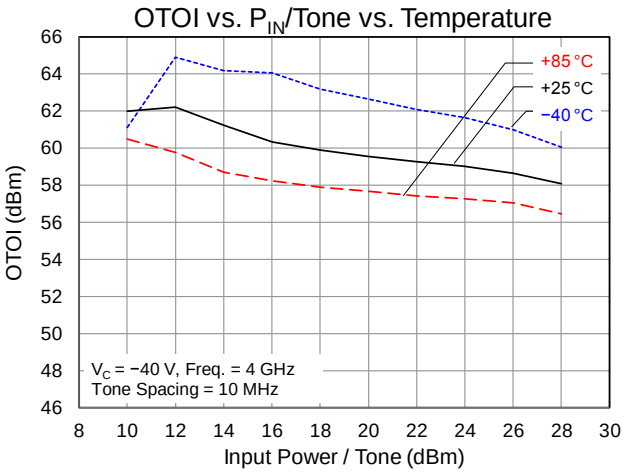


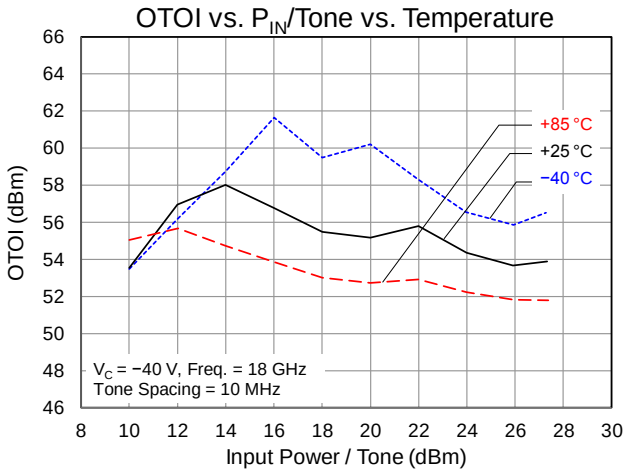
Performance Plots – Compression and Linearity











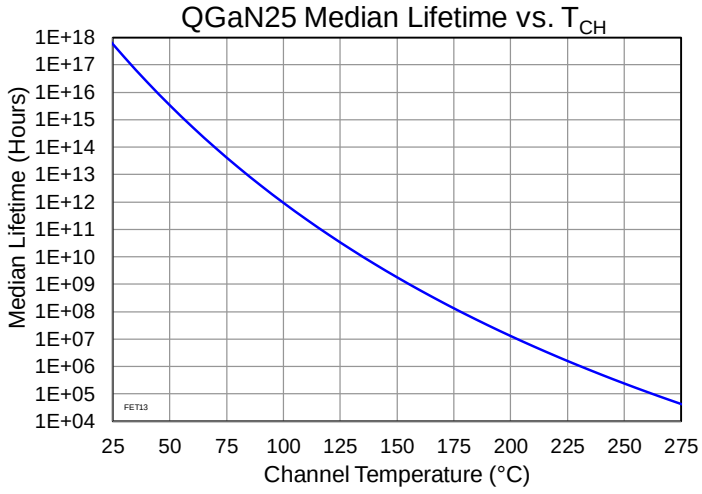
Thermal and Reliability Information

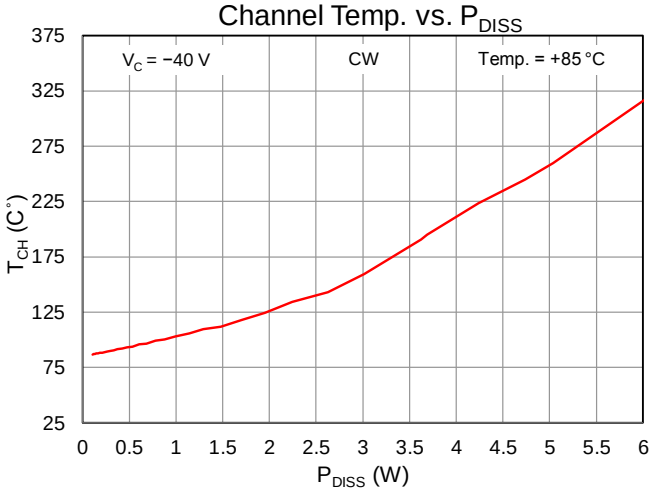
Parameter	Test Conditions	Value	Units
Thermal Resistance (θ_{JC}) (1)	T_{BASE} = 85 °C, V_{C1} = 0 V, V_{C2} = -40 V, Freq. = 14 GHz, CW P_{IN} = 40 dBm, P_{OUT} = 38 dBm, P_{DISS} = 3.69 W	29.81	ºC/W
Channel Temperature (T_{CH}) (1)		195	°C
Median Lifetime (T_M)		1.98E+7	Hrs
Thermal Resistance (θ_{JC}) (1)	T_{BASE} = 85 °C, V_{C1} = 0 V, V_{C2} = -40 V, Freq. = 16 GHz, CW P_{IN} = 39.5 dBm, P_{OUT} = 36.7 dBm, P_{DISS} = 4.24 W	32.78	ºC/W
Channel Temperature (T_{CH}) (1)		224	°C
Median Lifetime (T_M)		1.69E+6	Hrs
Thermal Resistance (θ_{JC}) (1)	T_{BASE} = 85 °C, V_{C1} = 0 V, V_{C2} = -40 V, Freq. = 18 GHz, CW P_{IN} = 39.5 dBm, P_{OUT} = 36.2 dBm, P_{DISS} = 4.74 W	33.76	ºC/W
Channel Temperature (T_{CH}) (1)		245	°C
Median Lifetime (T_M)		3.38E+5	Hrs

Notes:
1. Measured to the back of the package.

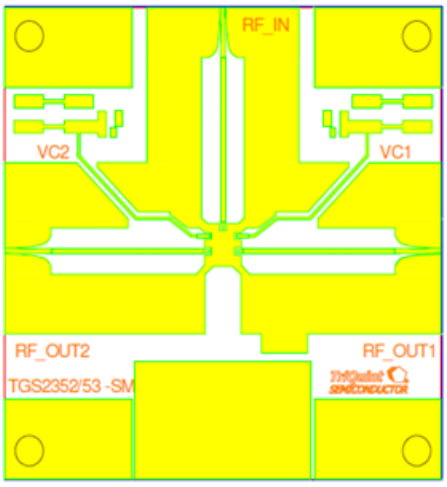
Median Lifetime and Channel Temperature

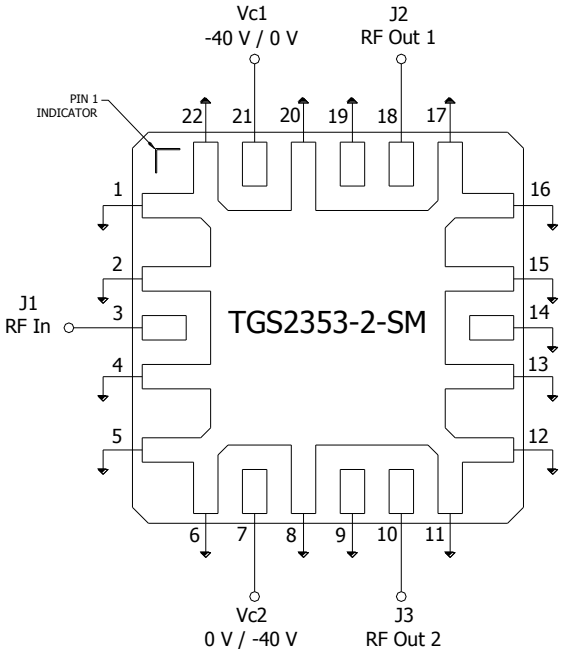
Test Conditions: V_D = +40 V; Failure Criteria = 10% reduction in I_{D_MAX} during DC Life Testing





Evaluation Board (EVB) and Application Circuit





Notes:

1. This switch can be configured as a Single Pole, Single Throw (SPST) by terminating one unused RF switched port with a 50 Ohm load.

Bias Up Procedure

1. V_{C1} or V_{C2} set to 0 V (see Function Table for RF Path)
2. V_{C2} or V_{C1} set to -40 V (see Function Table for RF Path)
3. Apply RF signal to RF Input

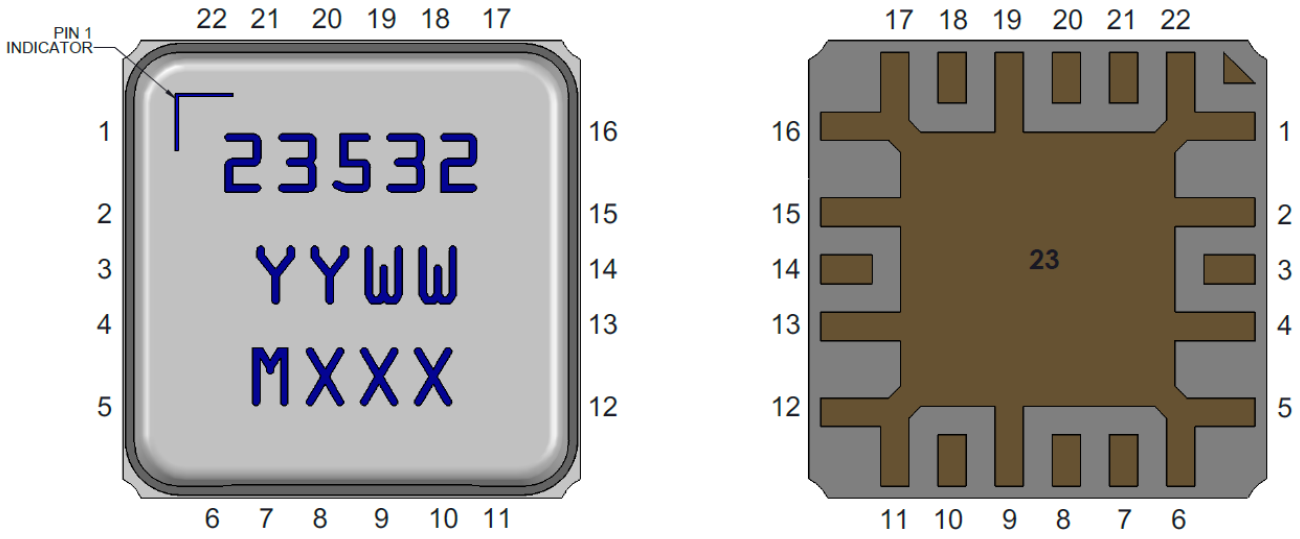
Bias Up Down

1. Turn off RF supply
2. Turn V_{C2} or V_{C1} to 0 V
3. Turn V_{C1} or V_{C2} to 0 V

Function Table

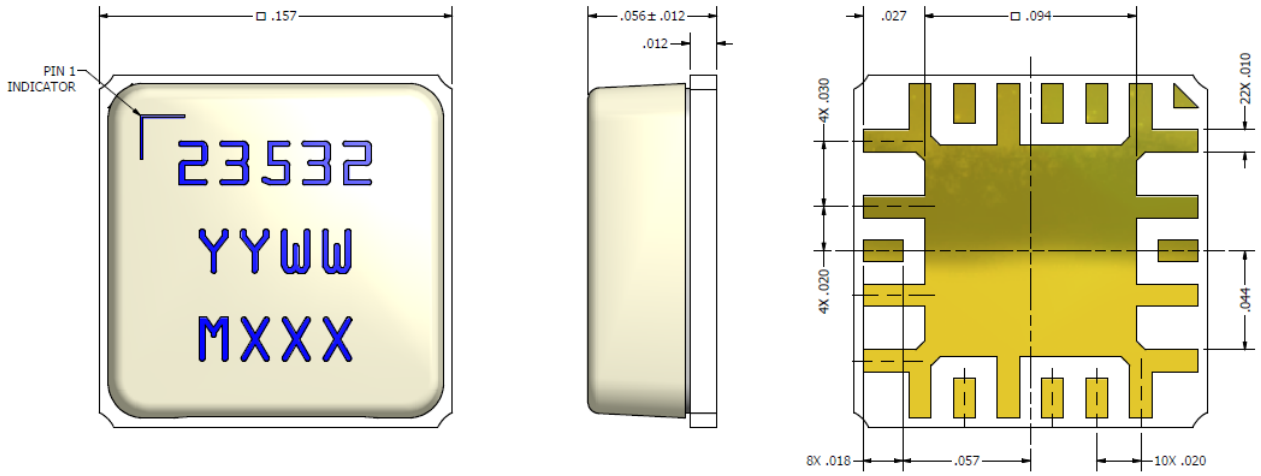
RF Path	State	V_{C1}	V_{C2}
RF In to RF Out1 (50 Ω load to RF Out2)	On-State (Insertion Loss)	0 V	−40 V
	Off-State (Isolation)	−40 V	0 V
RF In to RF Out2 (50 Ω load to RF Out1)	On-State (Insertion Loss)	−40 V	0 V
	Off-State (Isolation)	0 V	−40 V

Pin Configuration and Description



Pin No.	Label	Description
1, 2, 4-6, 8, 9, 11-17, 19, 20, 22	GND	Connected to ground paddle (23); must be grounded to PCB to improve isolation.
3	RF IN	RF Input, matched to 50 Ω; DC coupled
7	V_{C2}	Control voltage #2; External components are not required
10	RF OUT2	RF switched port 2; matched to 50 Ω; DC coupled
18	RF OUT1	RF switched port 1; matched to 50 Ω; DC coupled
21	V_{C1}	Control voltage #1; External components are not required
23	GND	Backside paddle. Multiple vias should be employed to minimize inductance and thermal resistance.

Package Marking and Dimensions



NOTES:
1. MATERIAL:
   PACKAGE BASE: CERAMIC
   PACKAGE LID: PLASTIC
2. PACKAGE LAND PATTERN IS GOLD PLATED.
3. PART IS EPOXY SEALED.
4. PART MARKING:
   23532 : PART NUMBER
   YY : PART ASSEMBLY YEAR
   WW : PART ASSEMBLY WEEK
   MXXX : BATCH ID

Notes:

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

TOLERANCES
X.XX = ±.01
X.XXX = ±.005
X.XXXX = ±.0010
ANGLES = ±1°

Recommended Soldering Profile