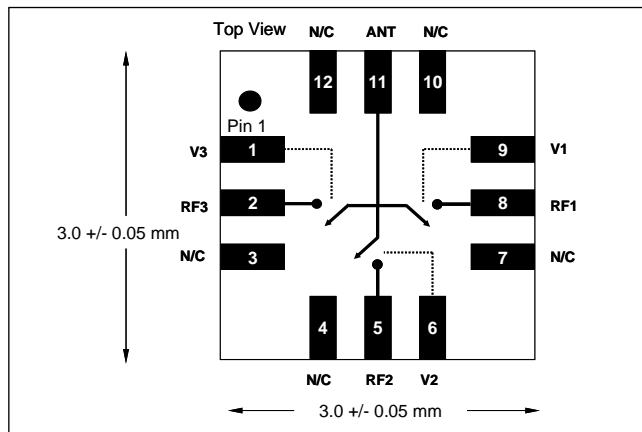


SP3T High Power 2.6V CDMA Antenna Switch

Functional Block Diagram



Product Description

TriQuint's TQP4M3018 is a high power antenna switch in a single pole three throw (SP3T) configuration. The die utilizes TriQuint's PHEMT MMIC switch process to provide optimized cross-modulation performance for use in CDMA applications. PHEMT Switches are a very low DC current replacement for classic PIN diode based switches. This product is ideally suited to applications where the antenna of a CDMA handset is to be routed to the Cellular duplexer, the PCS duplexer and the GPS receiver input. The design is symmetric and broadband allowing the user to assign cellular, PCS and GPS to ports RF1, RF2 or RF3 as desired.

Electrical Specifications^{1,2}

Parameter	Min	Typ	Max	Units
Cellular Insertion Loss		0.45	0.70	dB
GPS Insertion Loss		0.52	0.77	dB
PCS Insertion Loss		0.55	0.80	dB
Cellular Isolation	25	28		dB
GPS Isolation	20	23		dB
PCS Isolation	20	22		dB
Cellular Cross-Modulation ²		-120	-110	dBm
PCS Cross-Modulation ²		-120	-110	dBm

Note 1: Test Conditions $Z_0 = 50 \text{ ohms}$; $V_{\text{control}} = 0V/2.6V$, $T_c = 25^\circ C$.

Note 2: Cross-Modulation Test Conditions:

Cellular: $PTx1 = 23 \text{ dBm @ } 836 \text{ MHz}$, $PTx2 = 23 \text{ dBm @ } 837 \text{ MHz}$, $P_{\text{int}} = -23 \text{ dBm @ } 881.5 \text{ MHz}$

PCS: $PTx1 = 23 \text{ dBm @ } 1879.5 \text{ MHz}$, $PTx2 = 23 \text{ dBm @ } 1880.5 \text{ MHz}$, $P_{\text{int}} = -23 \text{ dBm @ } 1960 \text{ MHz}$

Features

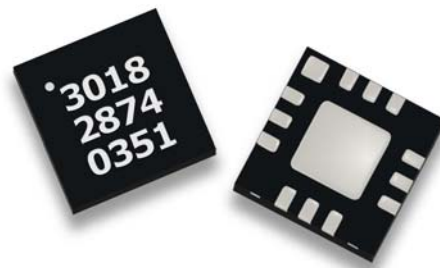
- MLP-12 Packaged PHEMT GaAs MMIC Die
- Excellent Cross-Modulation Performance
-120 dBm Typ @ Cellular
-120 dBm @ PCS
- Excellent ESD Rating: 300V HBM, 2000V CDM
- Low Control Voltage Operation to +2.4V
- High Isolation: 22dB typ at PCS Band
- Low Insertion Loss: 0.55 dB typ at PCS Band
- Very Low Control Current: 10 μA
- MLP-12 Package
- Small Footprint 3.0 x 3.0 mm

Applications

- CDMA Handset Antenna Switch for Cellular, PCS and GPS operation.

Package Style

MLP-12 lead 3 x 3 mm Package:



Data Sheet:

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Absolute Maximum Ratings

Symbol	Parameter	Absolute Maximum Value	Units
$P_{IN\ Max}$	Maximum Input Power	+38	dBm
V_{CTRL}	Control Voltage	+/- 6	VDC
T_C	Case Temperature, Survival	-40 to +85	°C
T_{STG}	Storage Temperature	-40 to +150	°C

Note: The part may not survive all maximums applied simultaneously.

Electrical Characteristics^{1,2}

Parameter (all paths)	Test Conditions	Units	Min	Typ	Max
Cellular Insertion Loss	Antenna to Selected Port (824 – 894 MHz)	dB		0.45	0.7
GPS Insertion Loss	Antenna to Selected RF Port (1574 – 1577 MHz)	dB		0.52	0.77
PCS Insertion Loss	Antenna to Selected RF Port (1850 – 1990 MHz)	dB		0.55	0.8
Cellular Isolation	RF Off Port to Selected RF On Port (824 – 894 MHz)	dB	25	28	
GPS Isolation	RF Off Port to Selected RF On Port (1574 – 1577 MHz)	dB	20	23	
PCS Isolation	RF Off Port to Selected RF On Port (1850 – 1990 MHz)	dB	20	22	
Cellular Cross Modulation	PTx1 = 23 dBm @ 836 MHz, PTx2 = 23 dBm @ 837 MHz, P _{int} = -23 dBm @ 881.5 MHz	dBm		-120	-110
PCS Cross Modulation	PTx1 = 23 dBm @ 1879.5 MHz, PTx2 = 23 dBm @ 1880.5 MHz, P _{int} = -23 dBm @ 1960 MHz	dBm		-120	-110
Cellular IIP3	Two tones; +23 dBm each; 837 MHz and 838 MHz	dBm		+73.4	
PCS IIP3	Two tones; +23 dBm each; 1880 MHz and 1881 MHz	dBm		+69.5	
2 nd Harmonic	Cellular; @ +25.5 dBm input	dBc		-88	
2 nd Harmonic	PCS; @ +24 dBm input	dBc		-85	
3 rd Harmonic	Cellular; @ +25.5 dBm input	dBc		-87	
3 rd Harmonic	PCS; @ +24 dBm input	dBc		-92	
P-0.1 dB	Cellular	dBm		+36.5	
P-0.1 dB	PCS	dBm		+36.3	
Return Loss	0.5 to 2.0GHz	dB		-25	-20
Leakage Current	-	μA		10	40
Trise, TFall	10% to 90% RF , 90% to 10% RF	μS			1
Ton , Toff	50% control to 90% RF, and 50% control to 10% RF	μS			1

Note 1: External DC Blocking capacitors are required at all RF ports.

Note 2: Test Conditions Z₀ = 50 ohms: V_{control} = 0V/2.6V, T_c = 25°C.

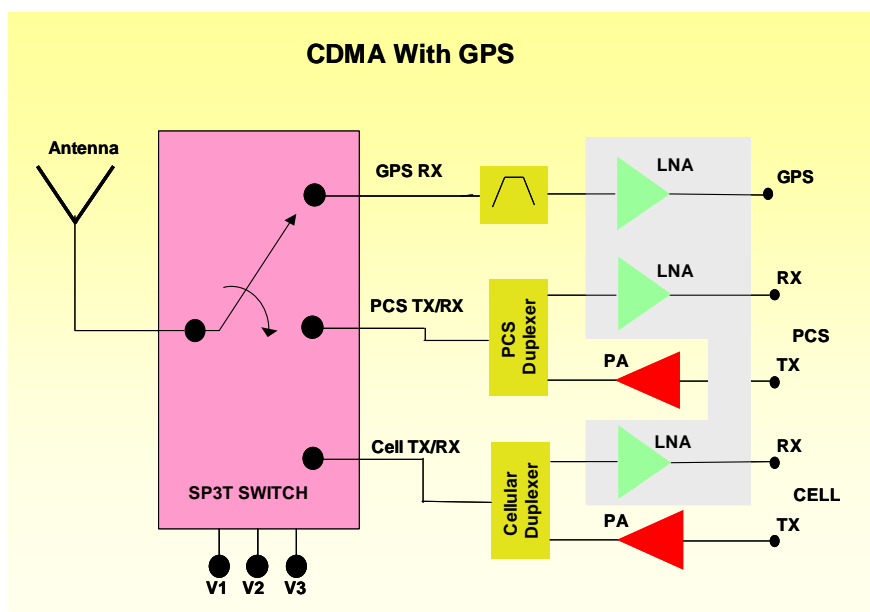
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Application Example:



Truth Table:

V1	V2	V3	ANT-RF1	ANT-RF2	ANT-RF3
1	0	0	On	Off	Off
0	1	0	Off	On	Off
0	0	1	Off	Off	On

Note 1: State 1 = +2.4V to +5.0V; State 0 = 0V to +0.2V

Note 2: Differential voltage from State 1 to State 0 must be a minimum of 2.4V

Note 3: DC grounding is not required. Control voltages applied to pins 1, 6 and 9 are differential, being 0v and 2.6V nominally.

Note 4: All pins including the package center paddle are n/c = no connection and not grounded as the preferred user configuration. RF performance figures are quoted with n/c. Grounding an n/c will not prevent the switch operation but may give a small degradation in RF performance.

Pin Descriptions:

Pad Number	Pad Name	Description
1	V3	Control RF Port 3
2	RF3	RF Port 3
3	N/C	No Connection
4	N/C	No Connection
5	RF2	RF Port 2
6	V2	Control RF Port 2
7	N/C	No Connection
8	RF1	RF Port 1 Port
9	V1	Control RF Port 1
10	N/C	No Connection
11	ANT	ANTENNA
12	N/C	No Connection

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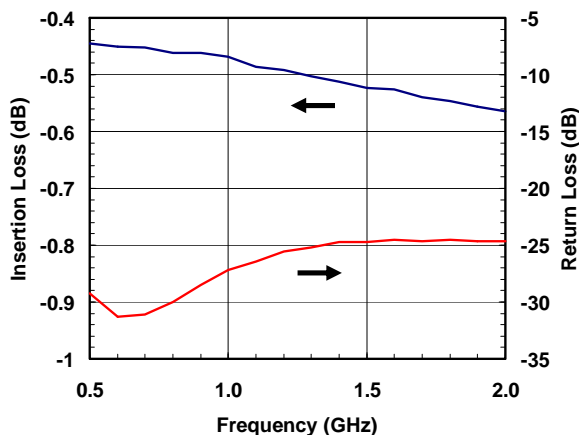
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Typical Performance:

Test Conditions (Unless Otherwise Specified): $Z_0 = 50\ \Omega$; $V_{\text{control}} = 0\text{V}/2.6\text{V}$, $T_c = 25^\circ\text{C}$.

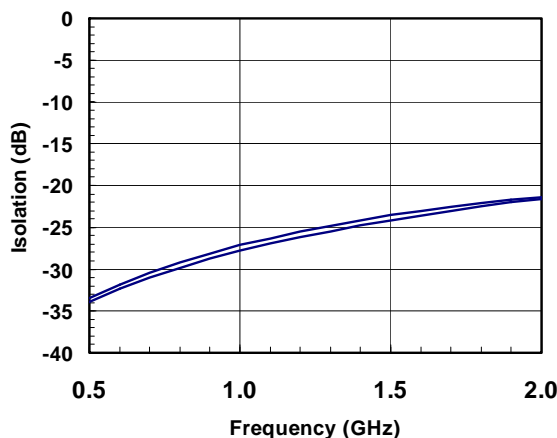
Insertion Loss and Match

($V_{\text{ctrl}} = 2.6\text{ V}$, $T = 25\text{ C}$)



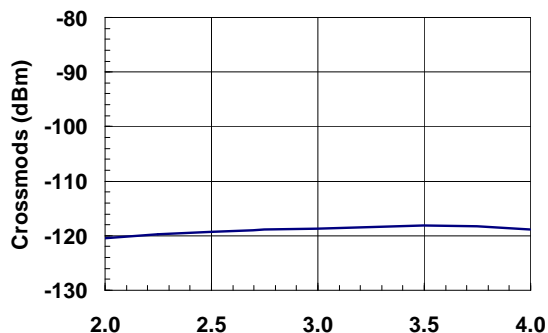
Isolation

($V_{\text{ctrl}} = 2.6\text{ V}$, $T = 25\text{ C}$)



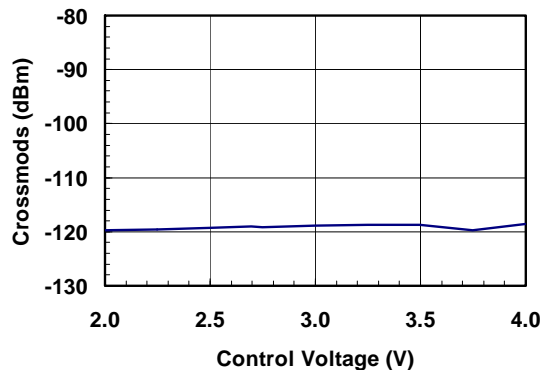
Low Band Cross Modulation

TQP4M3018 at $V_{\text{control}} = 2.6\text{ V}$
RF to Antenna Cell Band ($T = 25\text{ C}$)
CW interferer = -23 dBm at 881.5 MHz
 $P_{\text{in}} = 23\text{ dBm}$ each at 836 and 837 MHz



High Band Cross Modulation

TQP4M3018 at $V_{\text{control}} = 2.6\text{ V}$
RF to Antenna PCS Band ($T = 25\text{ C}$)
CW interferer = -23 dBm at 1960 MHz
 $P_{\text{in}} = 23\text{ dBm}$ each at 1879.5 and 1880.5 MHz

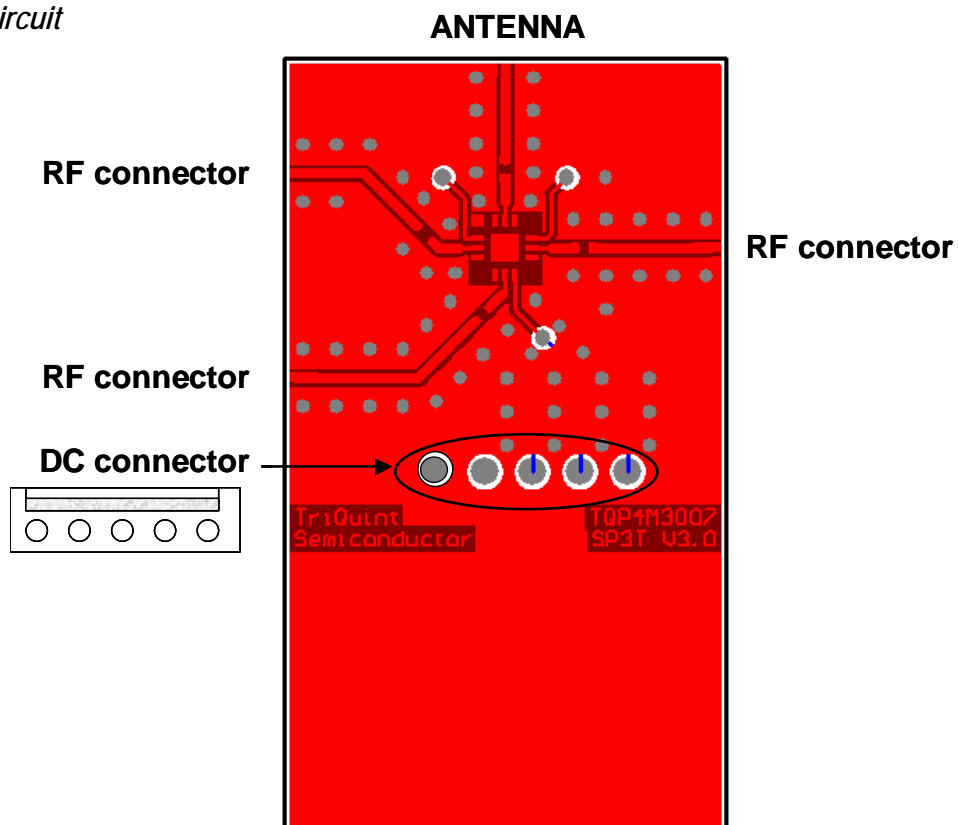


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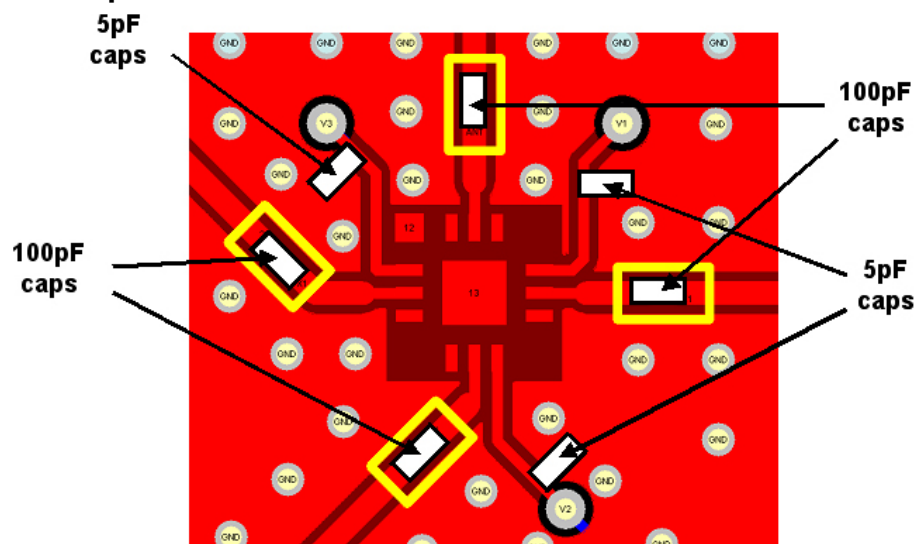
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Typical Test Circuit



Application Board Capacitors and Locations:



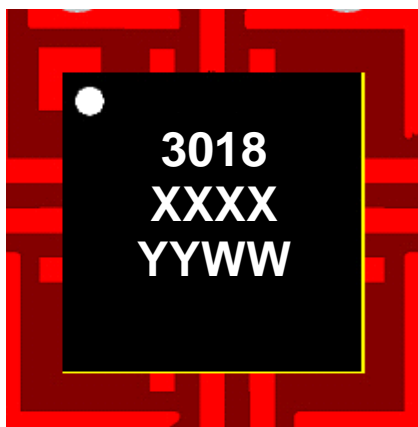
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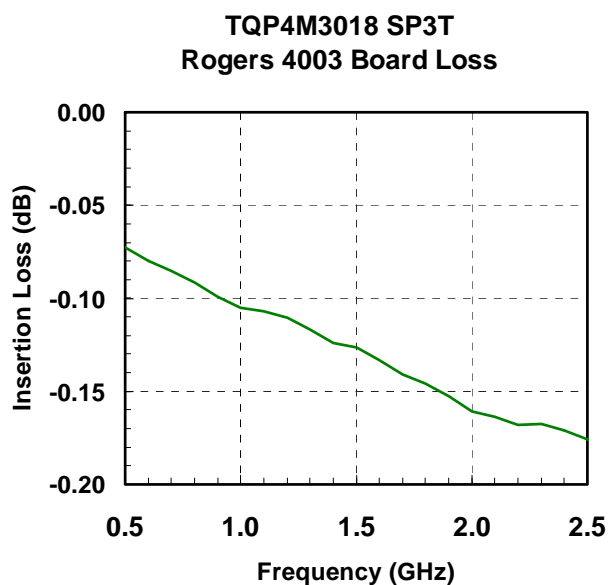
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Applications Information; Tuning Procedures; Board Layout Specifications:

Package Configuration on Board:



Applications Board Loss De-Embedding Curve:



Data Sheet:

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Part Marking Information:

TOP MARK

PIN 1



WHITE INK OR LASER MARK .

Line 1: 3018

Line 2: XXXX-TriQuint assembly lot number

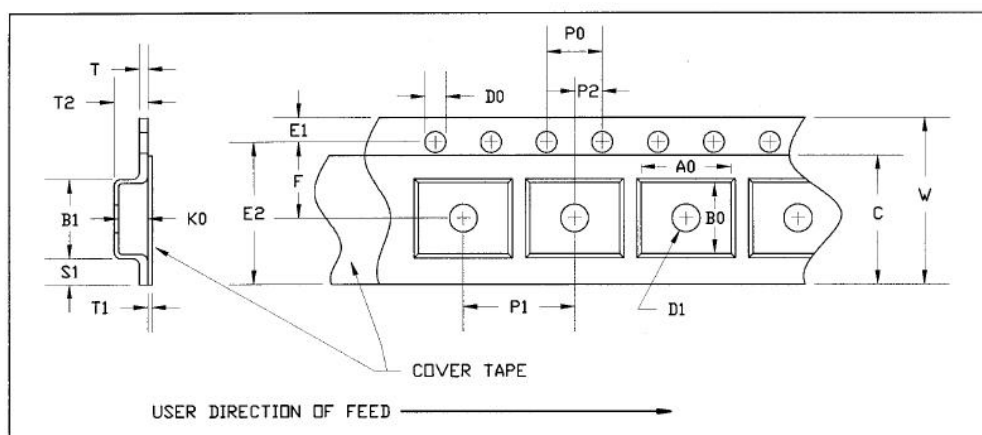
Line 3: YYWW = Year and Work Week

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Tape and Reel Information:



FIXED CARRIER AND COVER TAPE DIMENSIONS

PART	FEATURE	SYMBOL	SIZE (in)	SIZE (mm)
CAVITY	BOTTOM HOLE DIAMETER	D1	0.059	1.50
PERFORATION	DIAMETER	D0	0.059	1.50
	PITCH	P0	0.157	4.00
	POSITION	E1	0.069	1.75
CARRIER TAPE	THICKNESS	T	0.012	0.30
COVER TAPE	THICKNESS	T1	0.002	0.056

PART	FEATURE	SYMBOL	SIZE (in)	SIZE (mm)
CAVITY	LENGTH	A0	0.134	3.40
	WIDTH	B0	0.126	3.20
	DEPTH	K0	0.055	1.40
	PITCH	P1	0.157	4.00
DISTANCE BETWEEN CENTERLINE	CAVITY TO PERFORATION LENGTH DIRECTION	P2	0.079	2.00
	CAVITY TO PERFORATION WIDTH DIRECTION	F	0.138	3.50
COVER TAPE	WIDTH	C	0.213	5.40
CARRIER TAPE	WIDTH	W	0.315	8.00

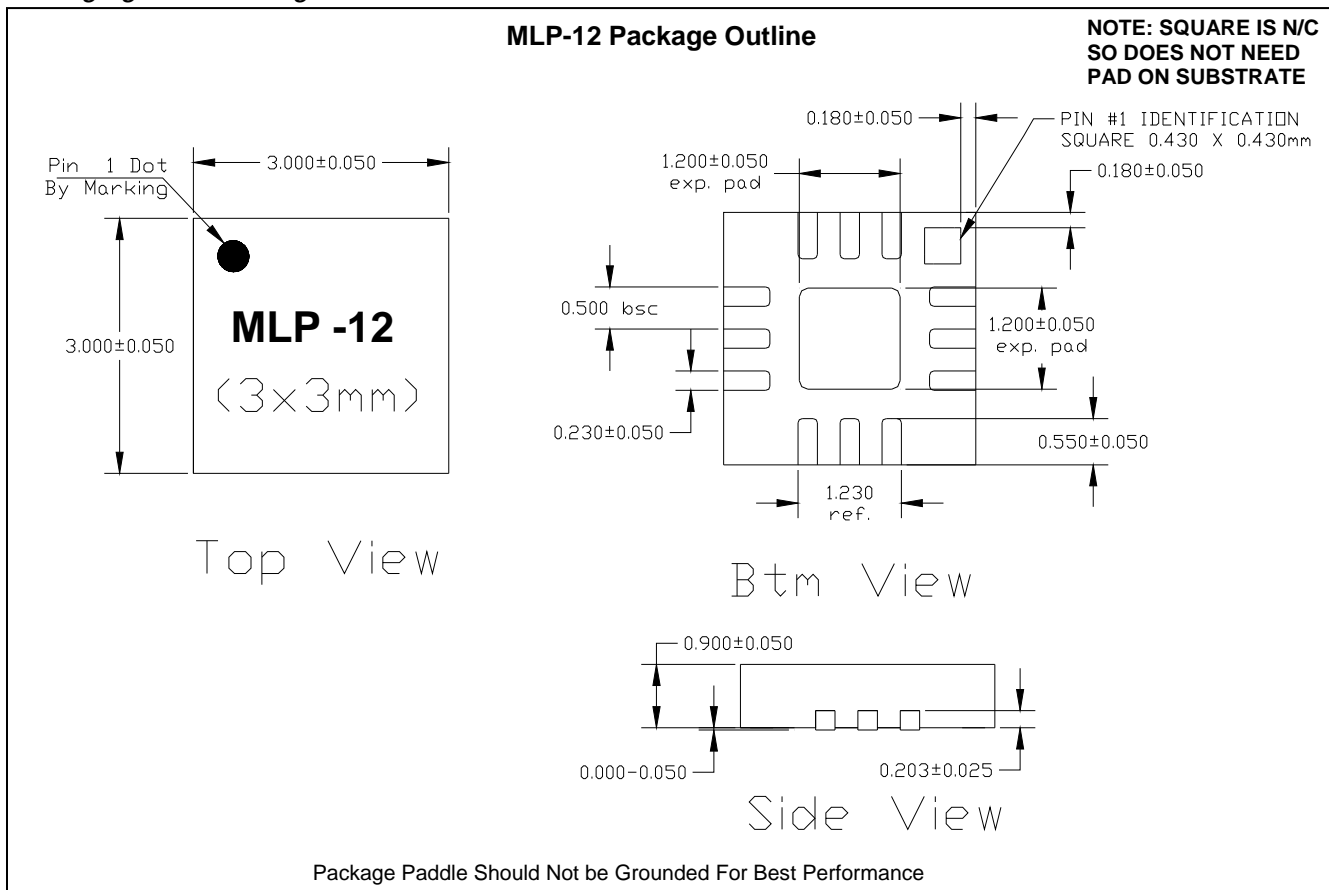
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Packaging and Ordering Information



Additional Information ¹

¹ For latest specifications, additional product information, worldwide sales and distribution locations, and information about TriQuint:

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Tel: (503) 615-9000

Email: info_wireless@tqs.com

Fax: (503) 615-8902

For technical questions and additional information on specific applications:

Email: info_wireless@tqs.com

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