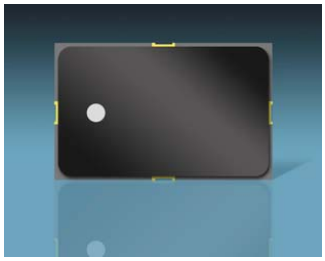
Surface Mount PIN Diode Limiters
MLM2060-300 & MLM2060-301
Series Datasheet

Features

- Surface Mount Limiter in Compact Outline: 8mm L x 5mm W x 2.5 mm H
- Incorporates PIN Limiter Diodes, D.C. Blocks & D.C. Return
- Higher Average Power Handling than Plastic (100 W Peak Power)
- Lower Insertion Loss (0.85 dB) & Lower Flat Leakage Power (19 dBm)
- RoHS Compliant



Description

The MLM2060-300 and MLM2060-301 Series of Surface Mount Silicon PIN Diode Limiters is manufactured using Aeroflex-Metelics proven hybrid manufacturing process incorporating PIN Diodes and passive devices integrated within a ceramic substrate. This low profile, compact , surface mount component, (8mm L x 5mm W x 2.5 mm H) offers superior low and high signal performance to comparable MMIC devices in QFN packages. The Limiter Modules are designed to optimize small signal insertion loss, (N.F.) and high signal flat leakage performance in a compact, surface mount package. The MLM2060-300 has Shunt PIN Limiter Diodes and a Shunt Coil with no D.C. Blocks, whereas the MLM2060-301 incorporates Shunt PIN Limiters Diodes, a Shunt Coil, and D.C. Blocks for versatility of design preference.

Using PIN Diodes with lower thermal resistance (< 40 °C/W), RF C.W. incident power levels of +36 dBm and RF peak incident power levels of + 50 dBm @ 1 µS RF pulse width, 0.001 duty cycle are very achievable in broadband Limiter Applications. The lower PIN Diode series resistance, (< 1.5 Ω), coupled with the smaller minority carrier lifetime, (< 20 ηS), provides lower flat leakage power (< + 20 dBm) and lower spike leakage energy (< 0.1 Ergs) for superior LNA protection.

Applications

These MLM2060-300 and MLM2060-301 Limiter Series are ideal for 2 to 6 GHz Radar, IED, and WiMax applications, requiring high volume, surface mount, solder re-flow manufacturing. These products are durable, reliable, and capable of meeting all military, commercial, and industrial environments. The devices are fully RoHS compliant and are available in tube or tape-reel.

Environmental Capabilities

The MLM2060-300 and MLM2060-301 Limiter Series is capable of meeting the environmental requirements of MIL-STD-750, MIL-STD-202, and MIL-STD-883.

ESD Rating

PIN Diodes are susceptible to ESD conditions as with all semiconductors. The ESD rating for these devices is Class 0, HBM.

Document No. DS12635, Rev. A
Revision Date: 6/3/09

MLM2060-300 & MLM2060-301 Electrical Specifications @ Zo = 50 Ω, TA=+ 25°C (Unless Otherwise Defined)

Parameter	Symbol	Units	Test Conditions	Minimum Value	Typical Value	Maximum Value
Frequency	F	GHz	Swept Frequency		2 - 6	
Insertion Loss	I_L	dB	Swept Frequency Po = 0 dBm		| -0.85 |	| -1.1 |
Return Loss	R_L	dB	Swept Frequency Po = 0 dBm	| -13 |	| -14 |	
Input Compression Power	P1dB	dBm	Swept Frequency	+7	+8	+10
2nd Harmonic	$2F_o$	dBc	Po = 0 dBm F = 4 GHz	45	50	
Peak Incident Power	P_{inc}(Pk)	dBm	RF Pulse Width = 1µS, 0.001 duty		+50	+51
C.W. Incident Power	P_{inc}(CW)	dBm	Swept Frequency		+35	+36
Flat Leakage Power	P_f	dBm	+50 dBm, RF Pulse Width = 1µS, 0.001 duty		+18	+20
Spike Leakage Energy	E_S	Ergs	+50 dBm, RF Pulse Width = 1µS, 0.001 duty		0.1	0.2
Recovery Time	T_r	ηS	(50% Trailing RF Pulse – 1dB IL)		100	150

Part Number Ordering Information:

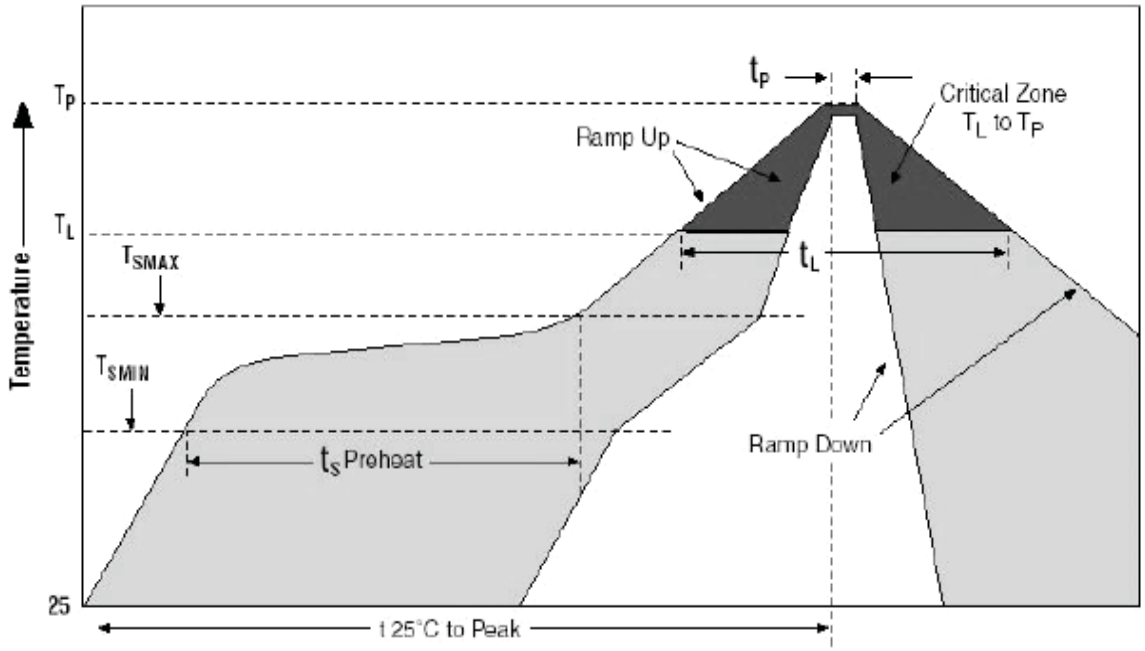
Part Number	Packaging
MLM2060-300-T	Tube
MLM2060-300-R	Tape-Reel
MLM2060-301-T	Tube
MLM2060-301-R	Tape-Reel

Assembly Instructions

The MLM2060-300 and MLM2060-301 Limiter Series is capable of being placed onto circuit boards with pick and place manufacturing equipment from tube, tape-reel, or wafflepack dispensing. The devices are attached to the circuit using conventional solder re-flow or wave soldering procedures with RoHS type or Sn 63 / Pb 37 type solders.

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	3°C/second maximum	3°C/second maximum
Preheat - Temperature Minimum (T_{SMIN}) - Temperature Maximum (T_{SMAX}) - Time (Minimum to maximum) (t_S)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
T_{SMAX} to T_L - Ramp-up Rate		3°C/second maximum
Time Maintauined above: - Temperature (T_L) - Time (t_L)	 183°C 60-150 seconds	 217°C 60-150 seconds
Peak Temperature (T_P)	225 +0 / -5°C	245 +0/-5°C
Time within 5°C of actual Peak Temperature (T_P)	10-30 seconds	20-40 seconds
Ramp-down Rate	6°C/second maximum	6°C/second maximum
Time 25°C to Peak Temperature	6 minutes maximum	8 minutes maximum

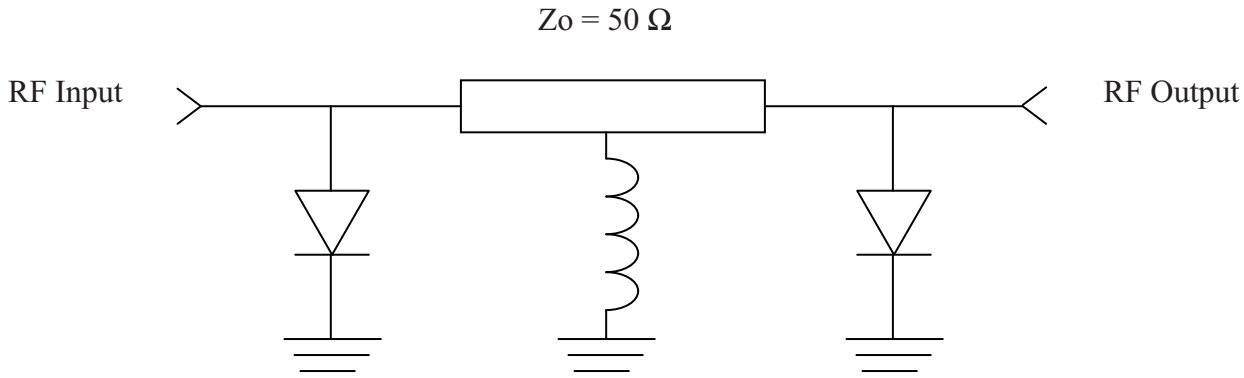
Graph1: Solder Re-Flow Time-Temperature Function



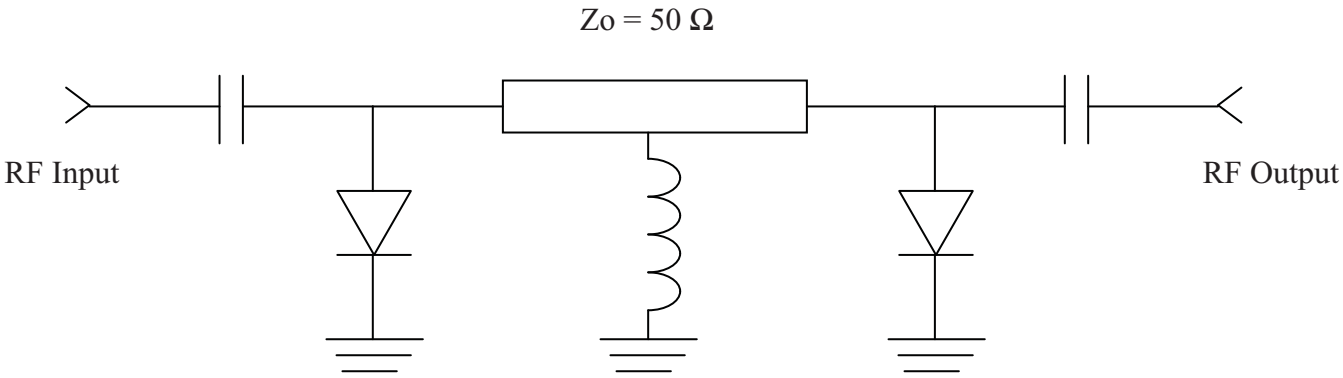
Absolute Maximum Ratings @ T_A = + 25 ºC (Unless Otherwise Defined)

Parameter	Absolute Maximum Value
Operating Temperature	-65 ºC to +125 ºC
Storage Temperature	-65 ºC to +150 ºC
Junction Temperature	+175 ºC
RF C.W. Incident Power @ + 85 ºC Source & Load VSWR < 1.2:1	+35 dBm
RF Peak. Incident Power @ + 85 ºC Source & Load VSWR < 1.2:1	+ 50 dBm, RF Pulse Width = 1µS, 0.001 duty cycle
Insertion Loss Rate of Change with Operating Temperature	| - 0.0025 dB / º C |
Assembly Temperature	+260 ºC for 10 Seconds

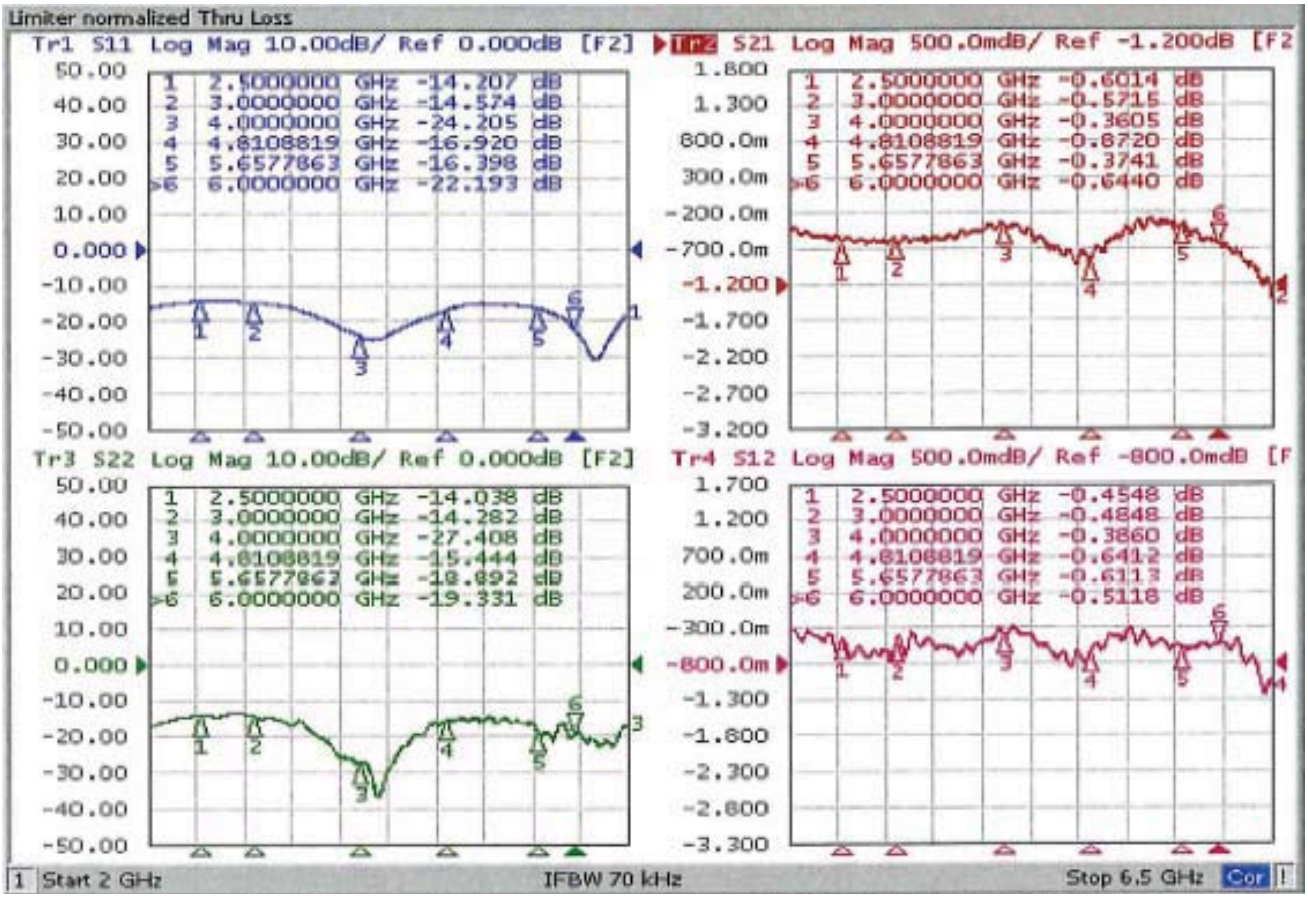
MLM2060-300 Limiter Schematic



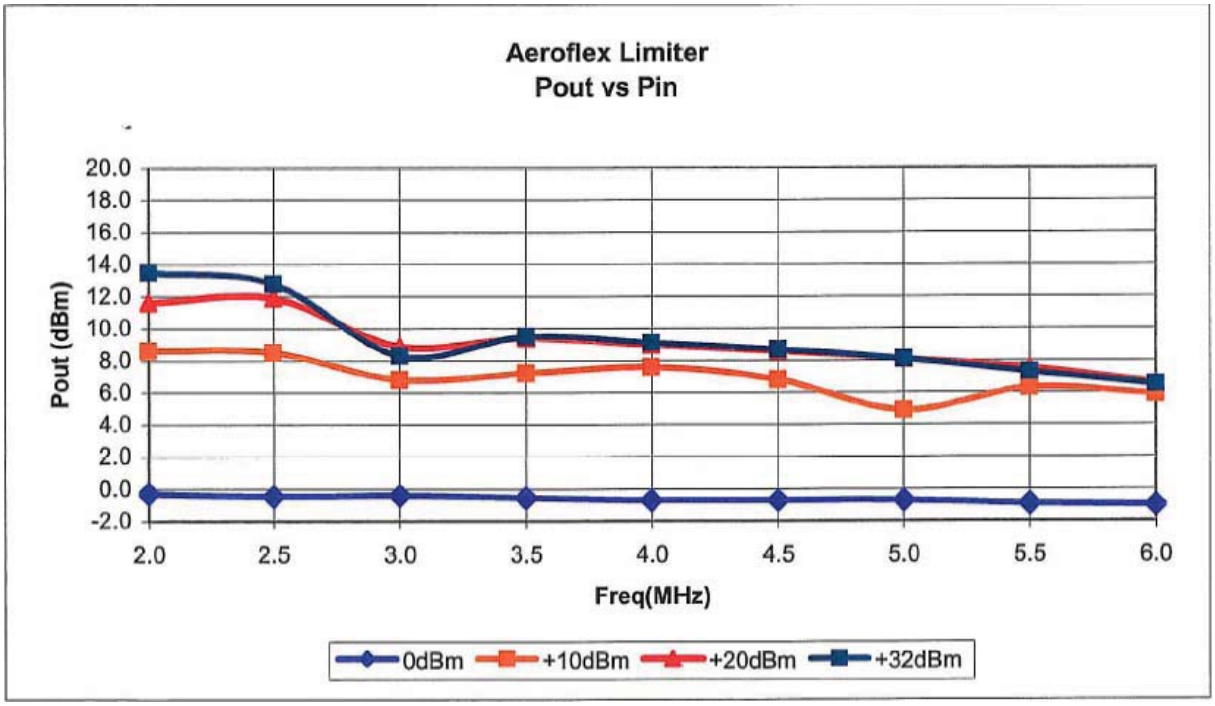
MLM2060-301 Limiter Schematic



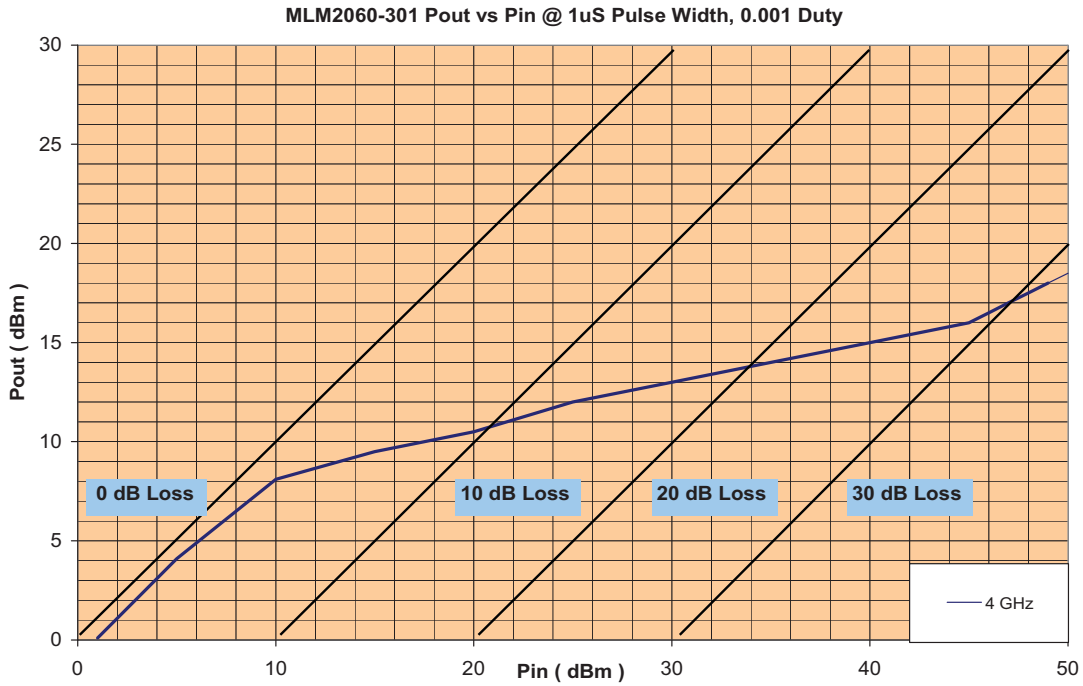
MLM2060-300 Typical RF Small Signal Performance @ +25 °C



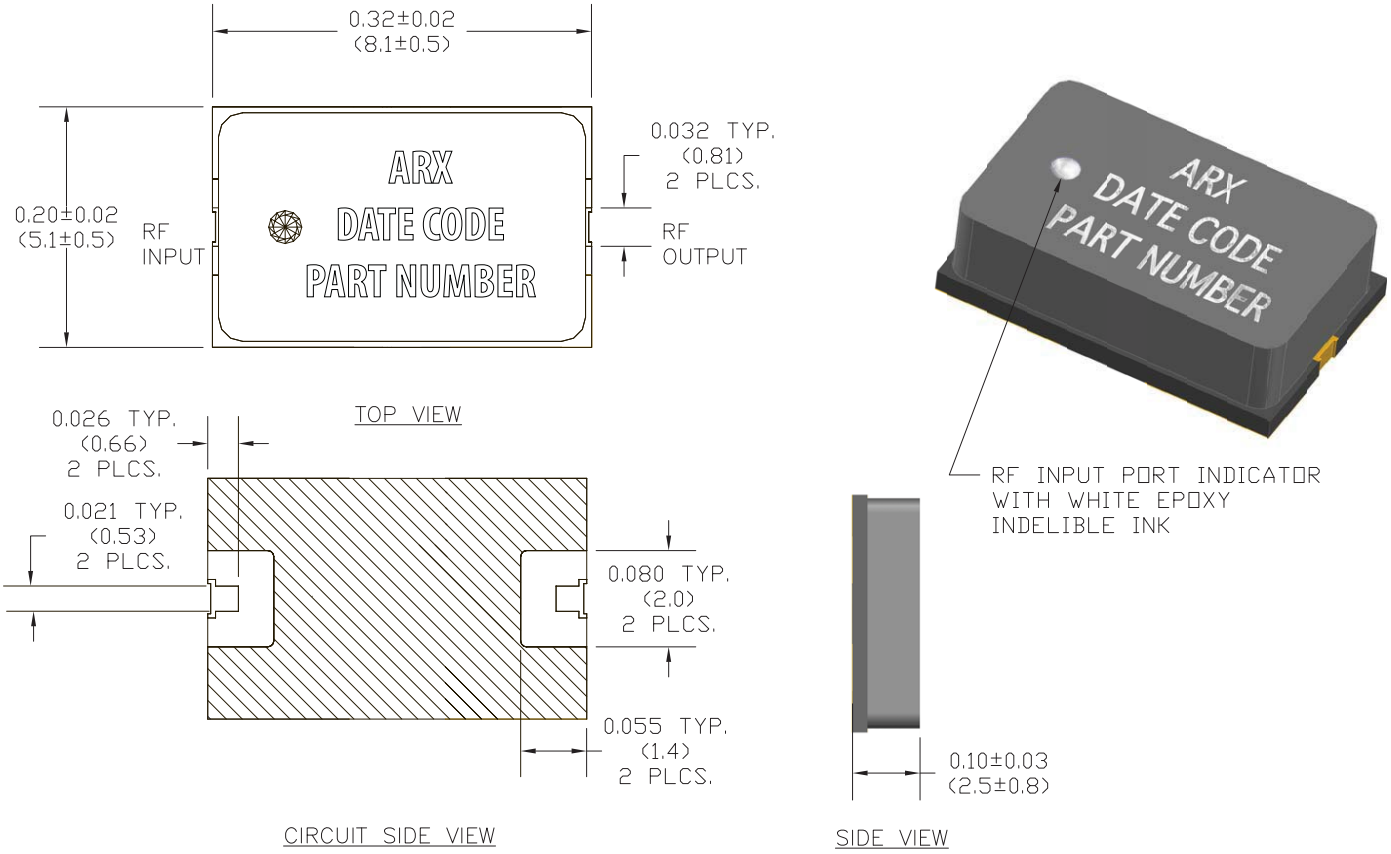
MLM2060-300 Typical RF C.W. Incident Performance @ +25 ºC



MLM2060-301 Typical RF Peak Incident Power Performance @ +25 ºC

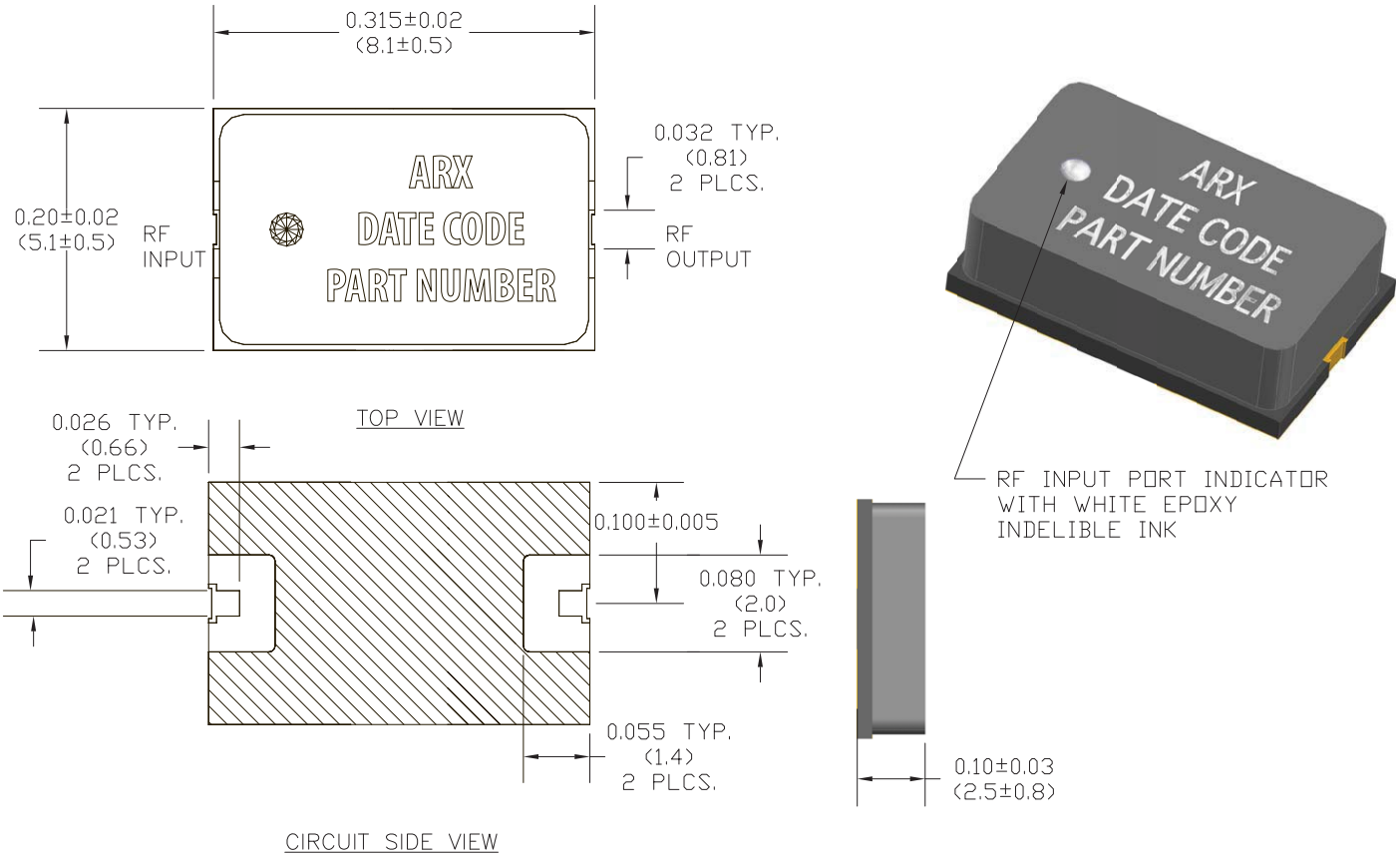


MLM2060-300 Outline Drawing, Case Style 300, (CS300)



NOTES:
1. SUBSTRATE MATERIAL: 20 MIL THICK ALUMINA NITRIDE (ALN) RF COVER: BLACK CERAMIC.
2. TOP SIDE AND BACKSIDE METALLIZATION: 100 µ IN. TYPICAL PLATED Au OVER Ti–Pd.
3. DIMENSION IN PARENTHESIS ARE IN MM.

MLM2060-301 Outline Drawing Case Style 301, (CS301)



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Revision Date: 6/3/09