High Power MELF PIN Diodes Series
MMP7072-127-1, MMP7076-127-1, MMP7080-127-1

Features

- Higher Average Power Handling: >100 Watts CW
- Higher Voltage Rating: >600 Volts
- Lower Rs: <0.8 (Lower Insertion Loss & Higher IIP3)
- Lower Thermal Resistance: <20 °C / W for Higher Power
- Ceramic Surface Mount Package
- RoHS Compliant
- Hermetically Sealed

Case Style 127-1

Description

The MMP7072-127-1, MMP7076-127-1, MMP7080-127-1 MELF PIN Diode Family is manufactured using Aeroflex/Metelics proprietary diode process which optimizes the anode and cathode bonding area of the diode to the adjacent heat spreading metal posts within the ceramic package. This unique geometry provides lower electrical and thermal resistance within the surface mount package to provide higher average power performance to comparable surface mount diode packages.

With lower Thermal Resistance (< 20 ºC/W), RF C.W. incident power levels of + 50 dBm and RF peak incident power levels of + 60 dBm are very achievable in higher power UHF cold switching applications.

The low series resistance (< 0.8 Ω), coupled with the longer minority carrier lifetime, (> 3 µS), provides better IIP3 distortion values > + 70 dBm, for SP2T Tx-Rx Switches.

These devices are hermetically sealed and are constructed with non-magnetic materials to meet stringent requirements for MRI systems. The devices are fully RoHS compliant.

Applications

The MMP7072-127-1, MMP7076-127-1 , MMP7080-127-1 MELF PIN Diode Family is designed to be used in Higher Power Switch and Attenuator applications, operating from 1 MHz to 1 GHz. These devices are durable, reliable, and are capable of meeting all military, commercial, and industrial applications.

Environmental Capabilities

The MMP7072-127-1, MMP7076-127-1 , and MMP7080-127-1 MELF PIN Diodes are capable of meeting the environmental requirements of MIL-STD-750.

ESD Rating

PIN Diodes are susceptible to ESD conditions as with all semiconductors. The ESD rating for these devices is Class 1A, HBM.

MMP7072-127-1, MMP7076-127-1, MMP7080-127-1
Electrical Specifications @ TA = + 25 °C (Unless Otherwise Defined)

Parameter	Symbol	Units	Test Conditions	Minimum Value	Typical Value	Maximum Value
Voltage Breakdown (See Note 1)	-Vb	Volts	| - 10 µA | @ DC	| - 100 |	| - 600 |	
Forward Voltage	Vf	Volts	+ 100 mA @ DC		0.85	1.0
Reverse Leakage Current	- Ir	ηA	| 80 % Min Vb | @ DC		| -100 |	| -1000 |
Series Resistance	Rs	Ω	+ 100 mA @ 100 MHz		0.5	0.8
Parallel Resistance	Rp	KΩ	-100 V @ 100 MHz	200	250	
Capacitance	Ct	pF	-100 V @ 1 MHz		0.62	0.70
Minority Carrier Lifetime	TL	µS	(50% Control – 90 % Output Voltage) If =+10 mA /-Ir =- 6 mA F = 1 KHz	3	4.5	6
C.W. Thermal Resistance	θ	°C/W	IH = 1A, IL = 10 mA		15	20

Electrical Specification Notes:

1. Minimum Vb values are as follows: MMP7072-127-1 > | -100 V |, MMP7076-127-1 > | -200 V |, MMP7080-127-1 > | -600 V |
2. Series Resistance, (Rs) and Parallel Resistance (Rp) are measured on the HP 4291 Impedance Analyzer.
3. Total Capacitance, (Ct) is the summation of the Diode Junction Capacitance, (Cj), and the Package Capacitance, Cpkg.

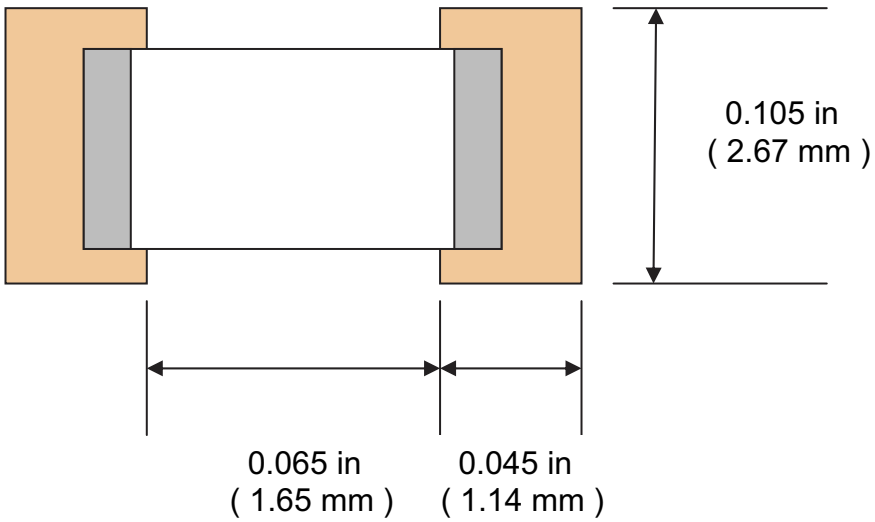
Absolute Maximum Ratings @ T_A = + 25 °C (Unless Otherwise Defined)

Parameter	Absolute Maximum Value
Forward Current	1000 mA
Reverse Voltage	| -700 | V (See Electrical Specification Note 1)
Forward Voltage	1.2 V @ 100 mA
Operating Temperature	- 65 °C to + 125 °C
Storage Temperature	- 65 °C to + 150 °C
Junction Temperature	+ 175 °C
Total Dissipated RF & D.C. Power (Diode Case in Air Ambient)	3W @ + 25 °C De-Rate Linearly at -20 mW / °C to 0 W @ + 175 °C
Total Dissipated RF & D.C. Power (Diode Case at Thermal Ground)	7.5 W @ + 25 °C De-Rate Linearly at -50 mW / °C to 0 W @ + 175 °C
Assembly Temperature	+ 310 °C for 10 Seconds

Assembly Instructions

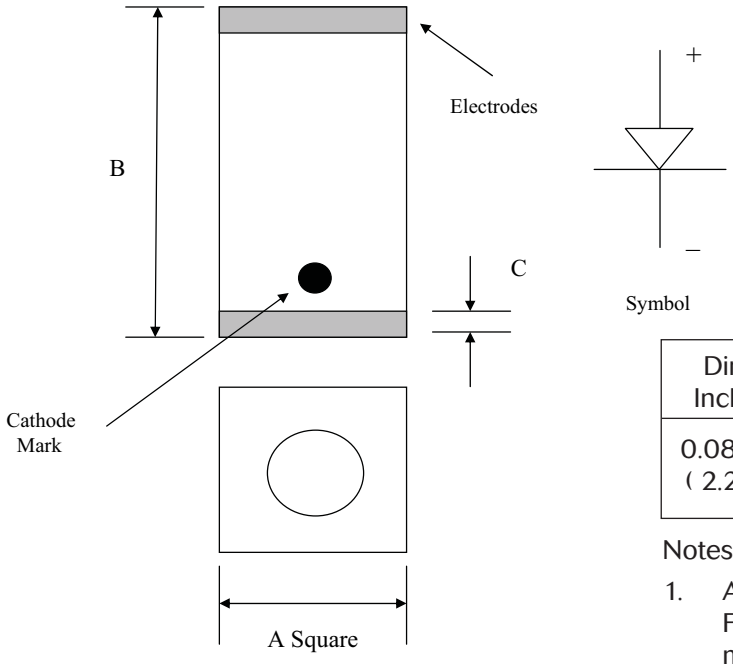
The MELF PIN Diodes are capable of being placed onto circuit boards with pick and place manufacturing equipment from tape-reel dispensing. The devices are attached to the circuit using conventional solder re-flow or wave soldering procedures with RoHS type or Sn 63 / Pb 37 type solders.

Circuit Pad Layout for MMP7072-127-1 MELF PIN Diode



Outline Drawing

Case Style 127-1 Outline



Symbol

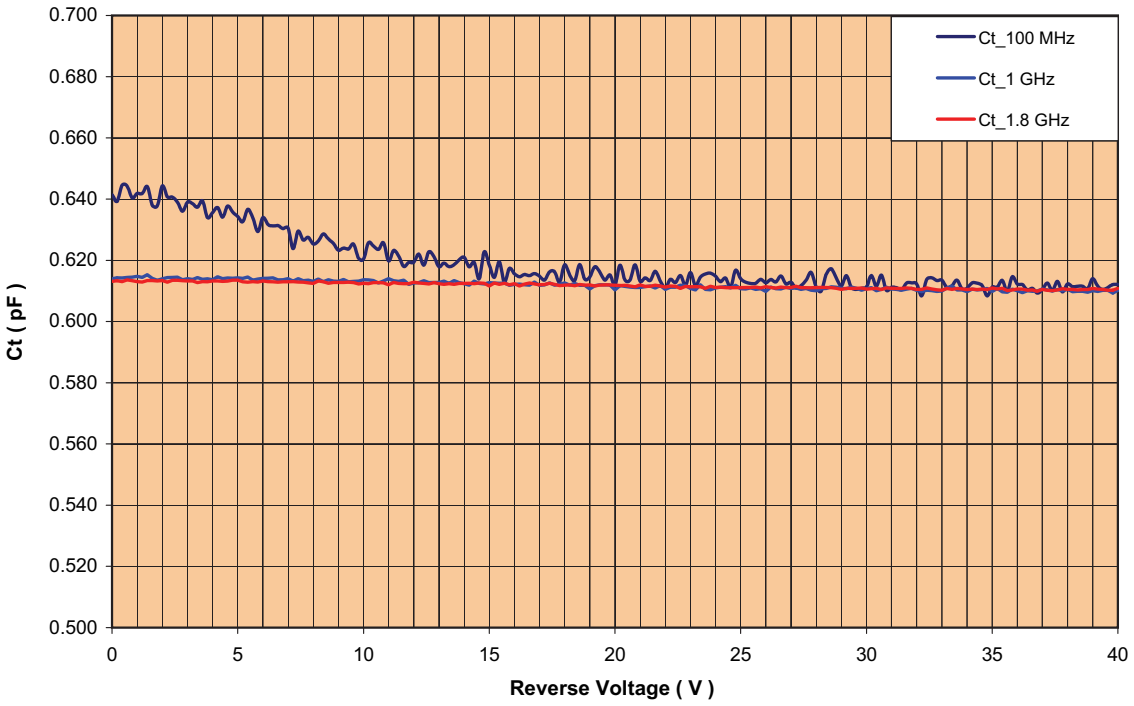
Dimension A Inches (mm)	Dimension B Inches (mm)	Dimension C Inches (mm)
0.088 +/- 0.007 (2.24 +/- 0.18)	0.125+/- 0.010 (3.18 +/- 0.25)	0.020 Typ (0.51)

Notes:

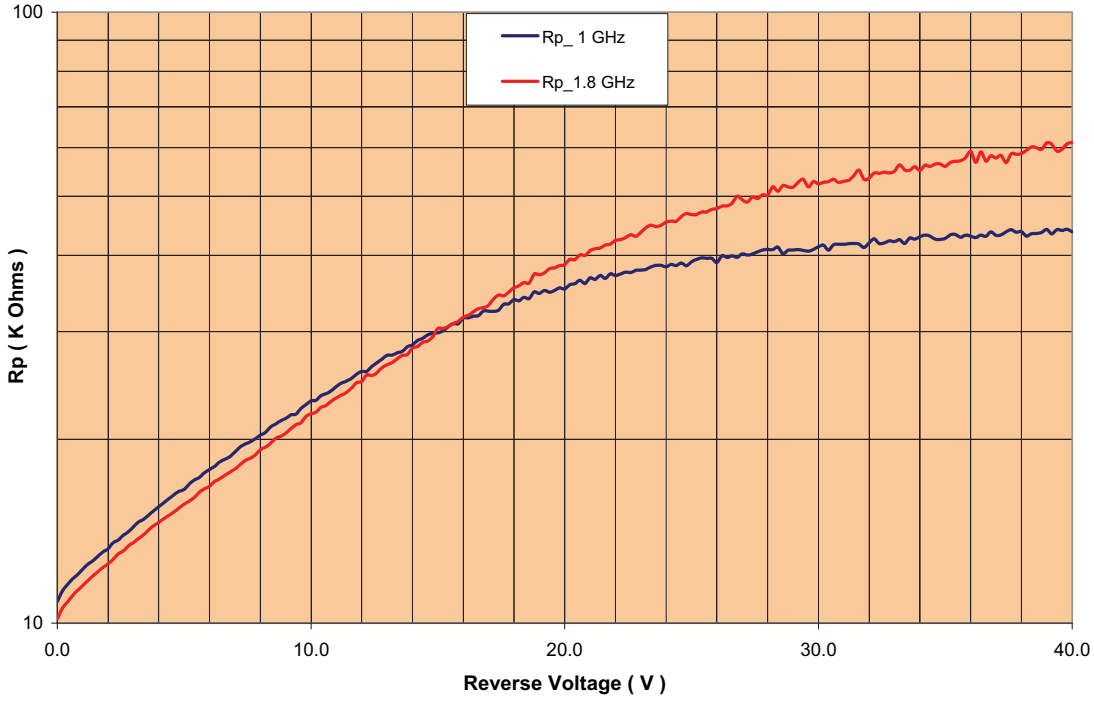
1. Anode and Cathode Electrodes are Electroplated as Follows: Minimum 70 u in Cu, followed by 100 u in minimum Sn per MIL-C-14550, Type I.

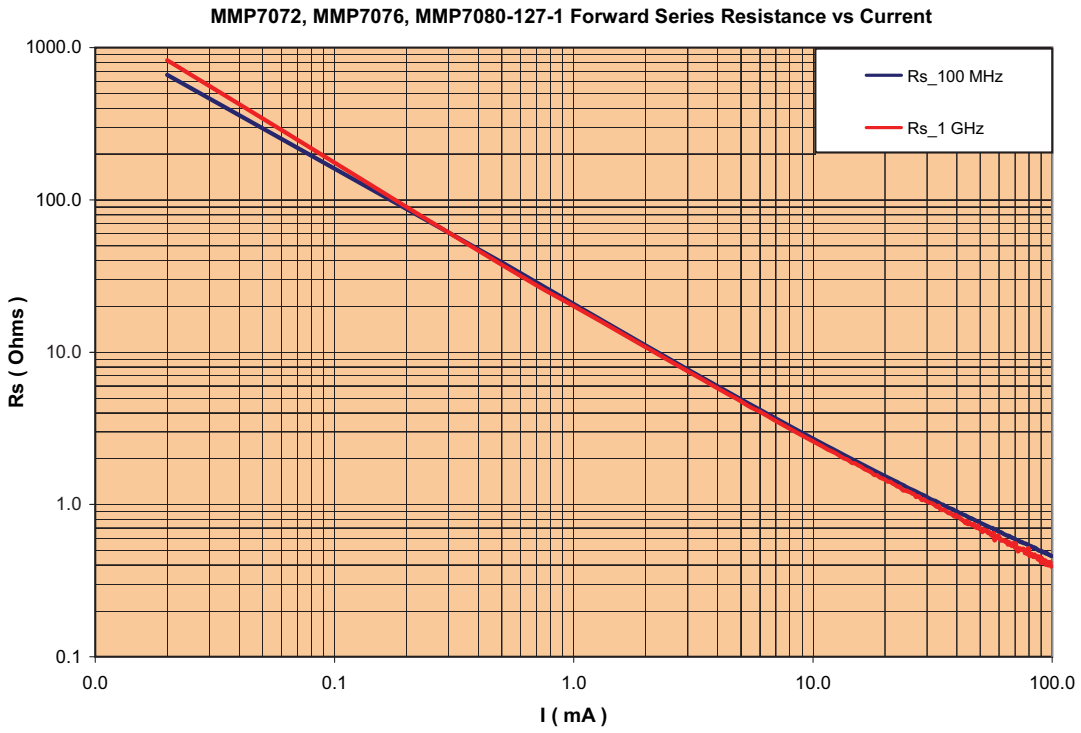
RF Performance

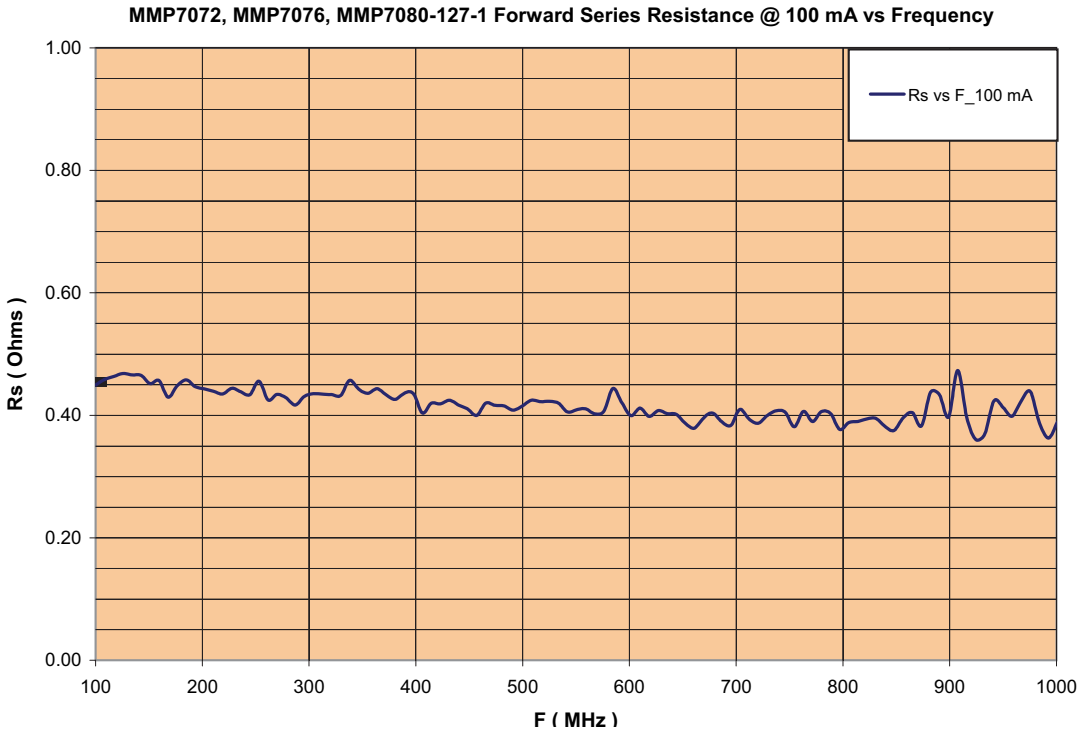
MMP7072, MMP7076, MMP7080-127-1 Capacitance vs Reverse Voltage



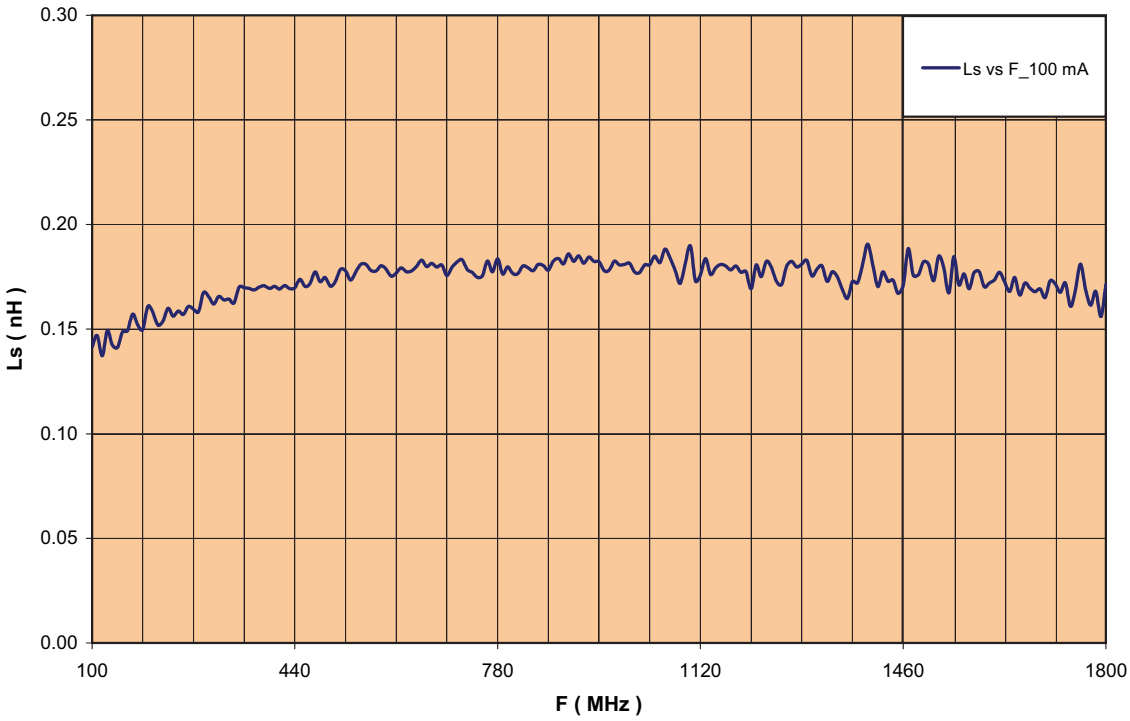
MMP7072, MMP7076, MMP7080-127-1 Parallel Resistance vs ReverseVoltage



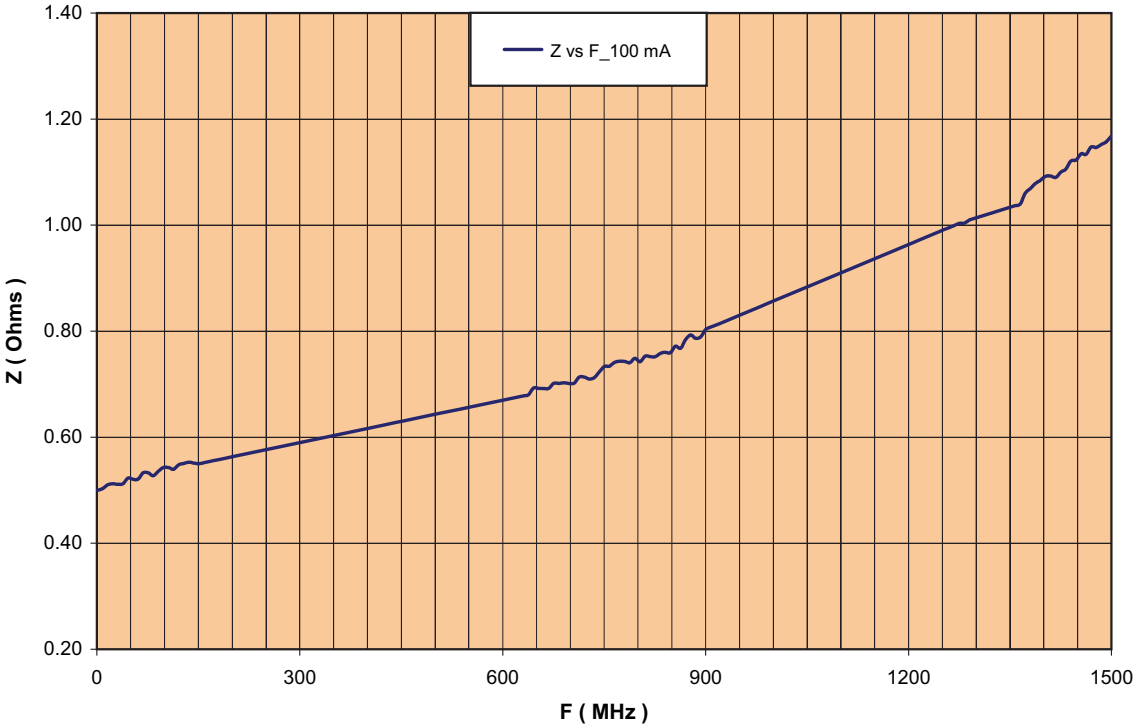

MMP7072, MMP7076, MMP7080-127-1 Forward Series Resistance vs Current
Rs_100 MHz
Rs_1 GHz
1000.0
100.0
10.0
1.0
0.1
Rs (Ohms)
0.0
0.1
1.0
10.0
100.0
I (mA)

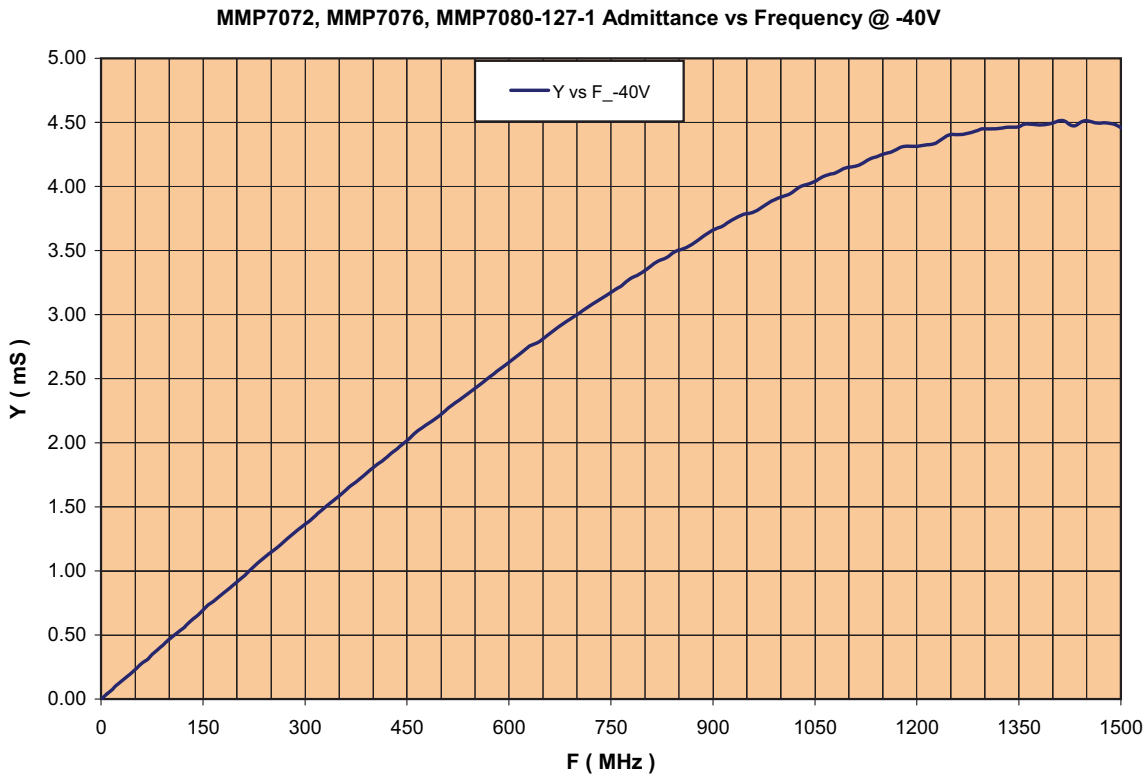

MMP7072, MMP7076, MMP7080-127-1 Forward Series Resistance @ 100 mA vs Frequency
Rs vs F_100 mA
1.00
0.80
0.60
0.40
0.20
0.00
Rs (Ohms)
100
200
300
400
500
600
700
800
900
1000
F (MHz)

MMP7072, MMP7076, MMP7080-127-1 Ls vs Frequency at 100 mA

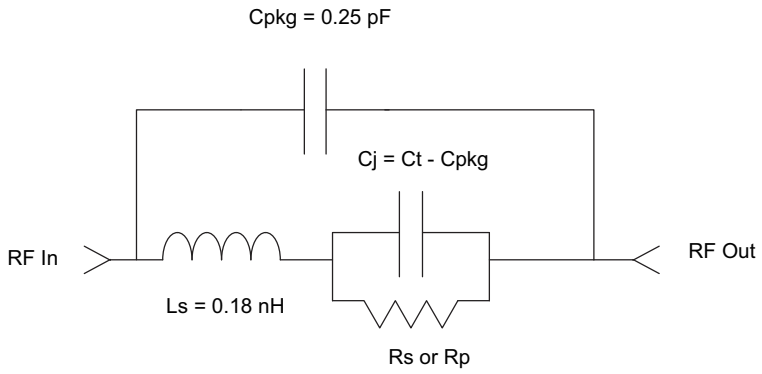


MMP7072, MMP7076, MMP7080-127-1 Impedance vs Frequency at 100 mA




MMP7072, MMP7076, MMP7080-127-1 Admittance vs Frequency @ -40V
Y vs F_-40V
Y (mS)
F (MHz)
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0
150
300
450
600
750
900
1050
1200
1350
1500

DEVICE MODEL



Parameter	Description	Value	Unit
Is	Saturation Current	1.0 E-14	Amps
Vi	I-region Forward Bias Voltage Drop	0.00	Volts
BV	Breakdown Voltage	600	Volts
UN	Electron Mobility	900	cm2/V-s
WI	I – Region Width	1.25 E-4	Meters
Rr	I-region 0V Bias Resistance	1.0 E+4	Ω
Cmin	PIN Punchthrough Capacitance	3.5 E-13	Farads
TAU	Am bipolar I-region Lifetime	4.5 E-6	Sec
Rs	Ohmic Resistance	0.8	Ω
CJ0	Junction Capacitance @ 0V	3.7 E-13	Farads
Vj	Junction Potential	0.70	Volts
M	Grading Coefficient	1.0	None
KF	Flicker Noise Coefficient	0	None
AF	Flicker Noise Exponent	1.0	None
FC	Forward Bias Depletion Capacitance Coefficient	0.5	None
FFE	Flicker Noise Frequency Exponent	1.0	None

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