# Spice Models for Aeroflex / Metelics PIN Diode Switch Elements

**PIN Diode SPST & SPDT Switch Elements**

| | | | | CHIP Robert Caverly Non-Linear Diode SPICE (N=1) | | | | | | | Wafer Eval | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PN** | **Description** | **SPICE Model** | **S Par's** | **Is mA** | **Iknee mA** | **Repi Ohms** | **$C_{Jmodel}$ pF** | **$R_{lim}$ Ω** | **t nSec** | **W um** | **$C_{J50}$ pF** | **Rs Ω** | **PKG** |
| MEST2G-010-20 | Series PIN | Y | Y | 2.50E-07 | 5 | 1000 | 0.04 | 3.00 | 50 | 8 | 0.04 | 1.50 | 2012 |
| MEST2GFC-010-25 | Series Pin | N | N | - | - | - | - | - | 50 | 8 | 0.03 | 1.60 | chip |
| MEST2G-020-15 | Series PIN | Y | Y | 5.30E-07 | 7 | 1000 | 0.04 | 2.56 | 60 | 8 | 0.08 | 0.75 | 2012 |
| MEST2G-025-10 | Series PIN Atten' | Y | N | 2.90E-06 | 30 | 2200 | 0.03 | 0.36 | 3000 | 140 | 0.11 | 1.2 - 2200 | CM32 |
| MEST2G-050-45 | Series PIN | N | N | - | - | - | - | - | 1200 | 40 | 0.19 | 0.40 | 2615 |
| MEST2G-050-80 | Series PIN | N | N | - | - | - | - | - | 2200 | 80 | 0.28 | 0.50 | 2615 |
| MEST2G-080-25 | Series Pin | Y | Y | 6.75E-07 | 200 | 1000 | 0.09 | 0.35 | 1550 | 80 | 0.09 | 0.97 | CM27 |
| MEST2G-150-10-CM30 | Series PIN | N | N | - | - | - | - | - | 3200 | 80 | 1.10 | 0.22 | CM30 |
| MEST2G-150-10-CM32 | Series PIN | Y | Y | 6.00E-06 | 50 | 1000 | 0.41 | 0.20 | 3300 | 80 | 0.35 | 0.45 | CM32 |
| MEST2G-150-20 | Series PIN | N | N | - | - | - | - | - | 1800 | 120 | 0.08 (1) | 1.8 (1) | CM26 |
| MSWSE-005-15 | Series PIN | Y | Y | 6.25E-07 | 3 | 1000 | 0.03 | 1.30 | 180 | 15 | 0.04 | 1.40 | 0503 |
| MSWSE-010-15 | Series PIN | Y | Y | 5.15E-07 | 5 | 1000 | 0.17 | 0.12 | 500 | 15 | 0.12 | 0.45 | 0503 |
| MSWSE-010-16S | Series PIN | N | N | - | - | - | - | - | 1000 | 40 | 0.15 (2) | 0.70 | 0402 |
| MSWSE-020-05 | Series PIN | Y | Y | 1.65E-06 | 200 | 4 | 0.63 | 0.27 | 600 | 15 | 0.53 | 0.10 | 0503 |
| MSWSE-040-10 | Series PIN | Y | Y | 1.46E-06 | 16 | 4000 | 0.15 | 0.71 | 700 | 40 | 0.12 | 0.60 | 0805P |
| MSWSE-044-10 | Series PIN | Y | Y | 2.62E-06 | 6 | 1000 | 0.26 | 0.55 | 1200 | 40 | 0.3 (2) | 0.50 | 0805P |
| MSWSE-045-10 | Series PIN | N | N | - | - | - | - | - | 1200 | 40 | 0.3 (2) | 0.50 | 0805P |
| MSWSE-050-10 | Series PIN | Y | Y | 8.52E-06 | 1000 | 1000 | 0.46 | 0.40 | 3200 | 80 | 0.53 (2) | 0.40 | 0805P |
| MSWSE-050-17 | Series PIN | Y | Y | 2.62E-06 | 6 | 1000 | 0.18 | 0.15 | 1600 | 80 | 0.20 (2) | 0.75 | 0805P |
| MSWSER-070-10 | Series PIN | N | N | - | - | - | - | - | 5500 | 80 | 0.9 (2) | 0.20 | 3023 |
| MSWSER-100-05 | Series PIN | N | N | - | - | - | - | - | 4000 | 90 | 0.65 | 0.28 | 3023 |
| MSWSH-020-30 | Shunt PIN | Y | Y | 3.50E-07 | 0.25 | 1000 | 0.10 | 0.15 | 600 | 15 | 0.14 | 0.40 | 2012 |
| MSWSH-020-24 | Series PIN | N | Y | | | | | | | 15 | 0.13 | 0.39 | 2020 |
| MSWSHB-020-30 | Shunt PIN | Y | Y | CF(4) | CF(4) | CF(4) | CF(4) | CF(4) | 2000 | --- | na | na | 2012 |
| MSWSH-040-30 | Shunt PIN | Y | Y | 1.46E-06 | 16 | 4000 | 0.15 | 0.71 | 1100 | 40 | 0.42(2) | 0.36 | 2012 |
| MSWSHC-040-40 | Shunt PIN | N | Y | - | - | - | - | - | 3000 | --- | na | na | 2615 |
| MSWSH-100-30 | Shunt PIN | Y | Y | 3.61E-06 | 6 | 1000 | 0.56 | 0.02 | 3900 | 80 | 0.40 | 0.40 | CM22 |
| MMSPN050-53 | Shunt PIN | N | Y | - | - | - | - | - | 4000 | --- | na | na | chip |
| MGPIN-XX-XX | GaAs PIN Chips | N | N | - | - | - | - | - | 6 - 10 | - | 0.03-0.15 | 0.85-3.0 | chips |
| MSWSS-020-40 | Series NIP<br>Shunt PIN | Y | Y | 5.85E-07<br>5.15E-07 | 5.64<br>3.95 | 1000<br>1000 | 0.11<br>0.14 | 0.90<br>0.25 | 200<br>450 | 15<br>15 | 0.05<br>0.14 | 1.00<br>0.50 | 2012 |
| MSWSSB-020-30 | Series NIP<br>Shunt PIN | Y | Y | CF(4) | CF(4) | CF(4) | CF(4) | CF(4) | 200<br>4300 | 15<br>--- | 0.05<br>na | 1.00<br>na | 2012 |
| MSWSS-040-30 | Series NIP<br>Shunt PIN | Y | Y | 3.1E-06<br>2.2E-06 | 15<br>15 | 1000<br>1000 | 014<br>'012 | 0.35<br>0.60 | 1500<br>2200 | 80<br>80 | 0.12<br>0.12 | 0.88<br>0.72 | 2012 |
| MSW2T-1001 | SPDT PIN Switch Module | N | N | - | - | - | - | - | 50 | 8 | 0.04 | 1.80 | 16L 3x3 |
| MSW2T-1003 | SPDT PIN Switch Module | N | N | - | - | - | - | - | 1000 | 40 | 0.17 | 0.50 | 16L 3x3 |
| MSAT-P25 | PIN Attenuator | Y | Y | 2.90E-06 | 30 | 2200 | 0.03 | 0.36 | 3000 | 140 | 0.11 | 1.2 - 2200 | 2012 |
| MSAT-N25 | NIP Attenuator | Y | Y | 6.75E-06 | 30 | 5000 | 0.10 | 0.08 | 3000 | 140 | 0.13 | 1.2 - 3000 | 2012 |

Introduced 2011 / 2012

Notes:
1. Two diodes in series
2. CT, total capacitance including package parasitics.
3. Max power measurement made at 1.3 GHz
4. Proprietary contact factory
5. With tuning

Revisions:

Jan 06, 2012: MSWSHC-040-40 40W max power, MSWSSB-020-30 55 dB Iso at 2.5 GHz
Feb 24, 2012: MSWSE-040-10 changed Rs from 3.0 at 10mA to 0.95 at 100mA
Mar 19, 2012: MSWSE-010-15 lot: PNPIN20-0005-4 Rs 0.45 & 0.65, MSWSE-040-10 0.60 at 100mA and 2.0 at 10mA lot #: PNPIN45-0001-8
Apr 30, 2012: MEST2G-050-45, MEST2G-050-80, MEST2G-080-25-CM27, MEST2G-150-10-CM30, MEST2G-150-10-CM32, MSW2T-1003-16L3x3
May 11, 2012: MEST2G-025-10-CM32

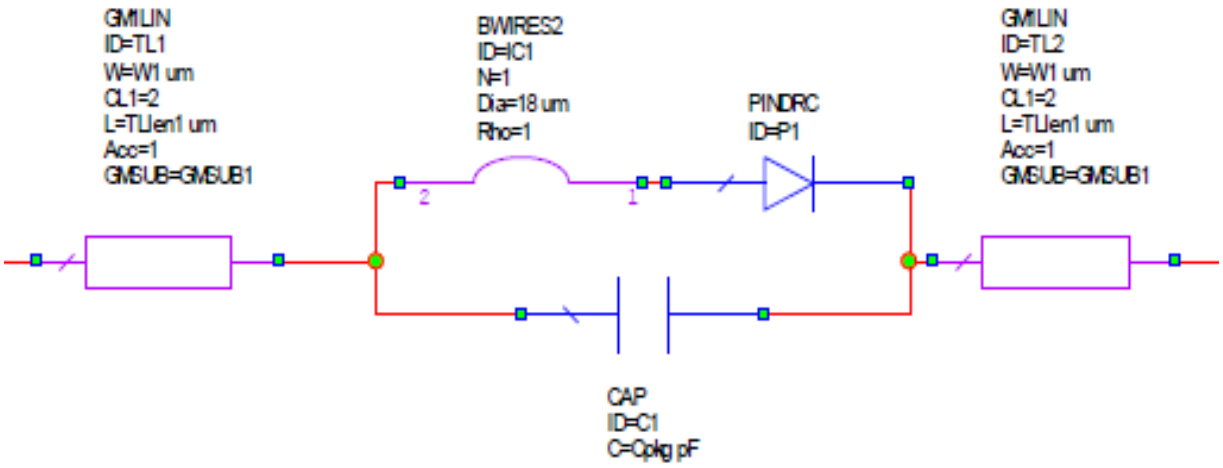
## 1. Package Stray Capacitance for SPICE Models

| PKG | Cstray pF | Comments |
|---|---|---|
| 0402 | 0.013 | input to output lead |
| 0503 | 0.018 | input to output lead |
| 0805 | 0.013 | input to output lead |
| 2012 | 0.011 | input lead to GND & output lead to GND |
| 2615 | 0.022 | input lead to GND & output lead to GND |
| 3023 | 0.025 | input to output lead |

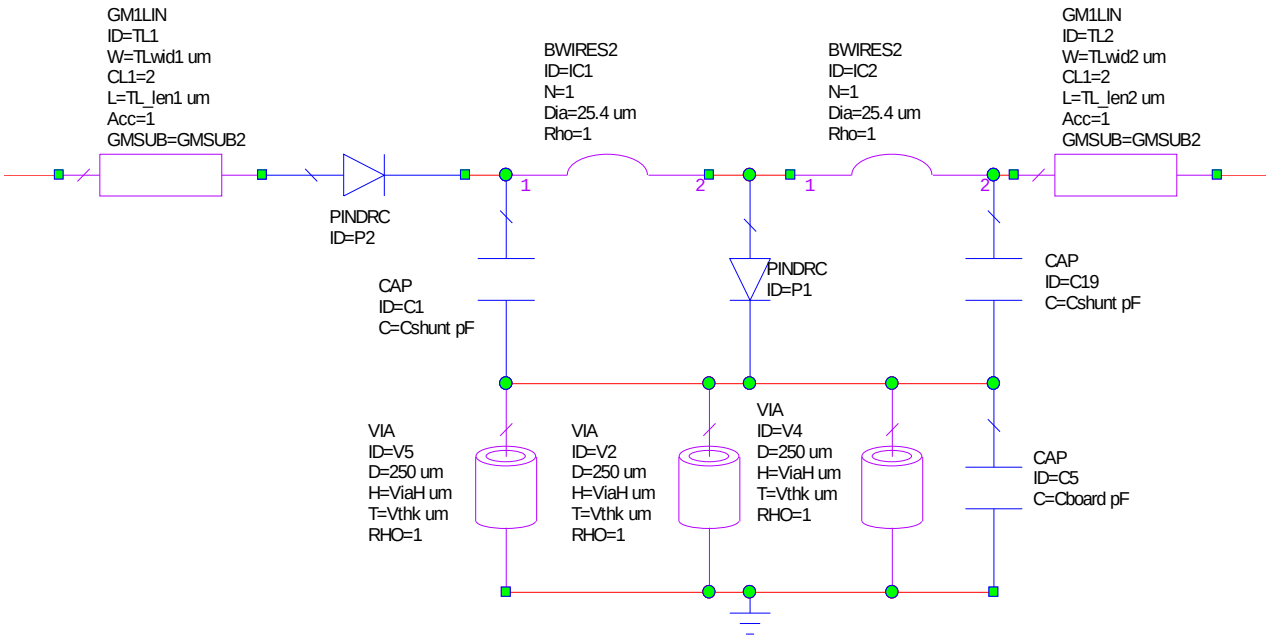
For each package, need to model the leads as a transmission line sandwiched between two dielectrics:

1. plastic molding compound on top (Er=4.55, Loss Tan=0.55)
2. substrate material on bottom

## 2. Lead PKG Model: 0402, 0503, 0805, 2615 & 3023



## 3. Lead PKG Model: 2012 (Via's are thru PCB)




## 4. Disclaimer

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