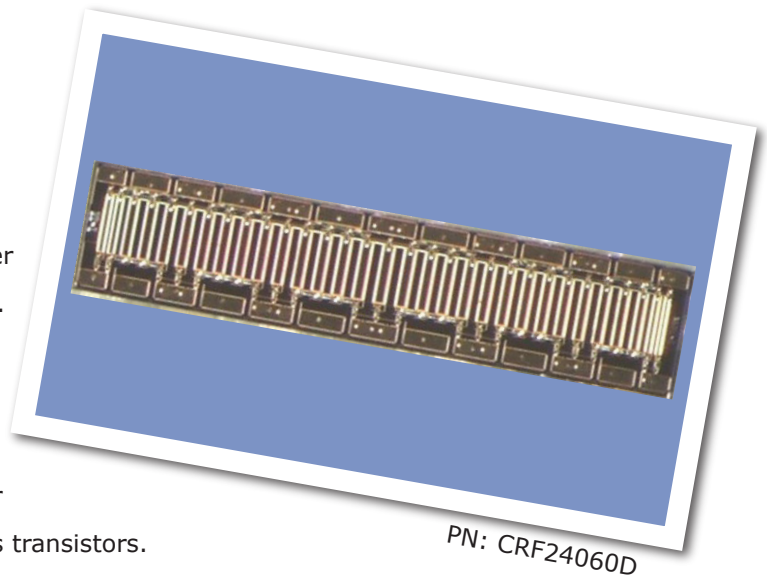


CRF24060D

60 W SiC RF Power MESFET Die

Cree's CRF24060 is a silicon carbide (SiC) RF power Metal-Semiconductor Field-Effect Transistor (MESFET). SiC has superior properties compared to silicon or gallium arsenide, including higher breakdown voltage, higher saturated electron drift velocity, and higher thermal conductivity. SiC MESFETs offer greater power density and wider bandwidths compared to Si and GaAs transistors.



PN: CRF24060D

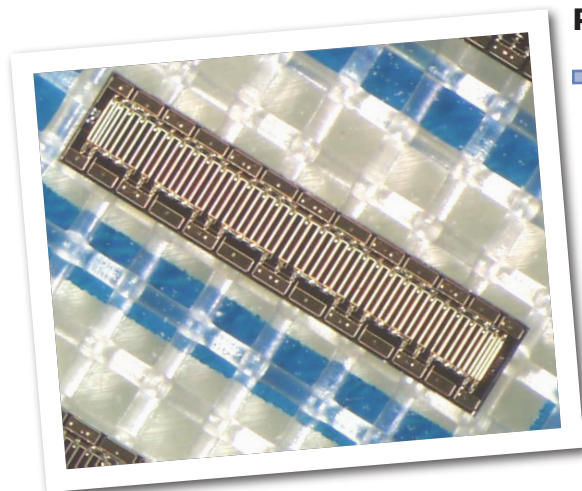
FEATURES

- 13 dB Small Signal Gain at 1.5 GHz
- 60 W Typical P_{1dB}
- 48 V Operation
- High Breakdown Voltage
- High Temperature Operation
- Up to 5 GHz Operation
- High Efficiency

APPLICATIONS

- Wideband Military Communications
- Secure Comms for Homeland Defense
- Class A, AB Amplifiers
- TDMA, EDGE, CDMA and W-CDMA
- Broadband Amplifiers
- MMDS

Packaging Information



- Bare die are shipped in Gel-Pak® containers.
- Non-adhesive tacky membrane immobilizes die during shipment.



Absolute Maximum Ratings (not simultaneous) at 25 °C

| Parameter | Symbol | Rating | Units |
|---|-----------------|----------|-------|
| Drain-source Voltage | V_{DSS} | 120 | VDC |
| Gate-source Voltage | V_{GS} | -20, +3 | VDC |
| Storage Temperature | T_{STG} | -55, 150 | °C |
| Operating Junction Temperature | T_J | 255 | °C |
| Thermal Resistance, Junction to Case ¹ | $R_{\theta JC}$ | 1.4 | °C/W |
| Mounting Temperature (30 seconds) | T_s | 320 | °C |

¹Eutectic die attach using 80/20 AuSn mounted to a 60 mil thick CuMoCu carrier.

Electrical Characteristics (TC = 25 °C)

(Measured using eutectic die attach with 80/20 AuSn solder mounted to a 60 mil thick CuMoCu carrier)

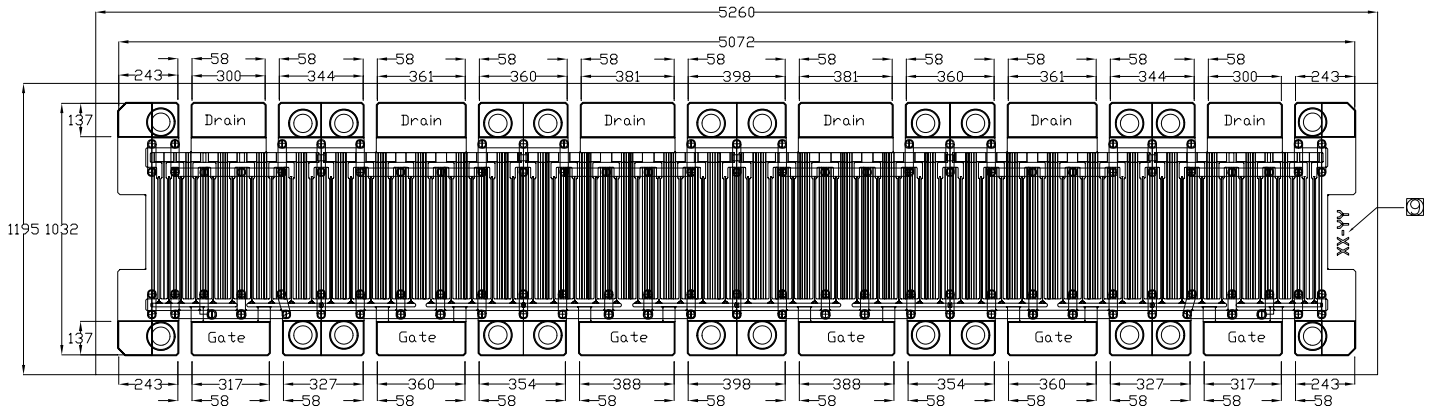
| Characteristics | Symbol | Min. | Typ. | Max. | Units | Conditions |
|----------------------------------|---------------|------|------|------|-------|---|
| DC Characteristics | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | -13 | -10 | - | VDC | $V_{DS} = 10\text{ V}, I_D = 2.5\text{ mA}$ |
| Gate Quiescent Voltage | $V_{GS(Q)}$ | - | -7 | - | VDC | $V_{DS} = 48\text{ V}, I_D = 2000\text{ mA}$ |
| Zero Gate Voltage Drain Current | I_{DSS} | 6.0 | 7.5 | 9.0 | A | $V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}$ |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | 100 | - | - | VDC | $V_{GS} = -18, I_D = 50\text{ mA}$ |
| Forward Transconductance | g_m | 700 | 800 | - | mS | $V_{DS} = 48\text{ V}, I_D = 2000\text{ mA}$ |
| RF Characteristics | | | | | | |
| Gain | G_{SS} | 10 | 13 | - | dB | $V_{DD} = 48\text{ V}, I_{DQ} = 2000\text{ mA}, f = 1500\text{ MHz}$ |
| Power Output at 1 dB Compression | P_{1dB} | 50 | 60 | - | W | $V_{DD} = 48\text{ V}, I_{DQ} = 2000\text{ mA}, f = 1500\text{ MHz}$ |
| Drain Efficiency ^{1,2} | η | 40 | 45 | - | % | $V_{DD} = 48\text{ V}, I_{DQ} = 2000\text{ mA}, f = 1500\text{ MHz}, P_{OUT} = P_{1dB}$ |
| Intermodulation Distortion | IMD_3 | - | -31 | - | dBc | $V_{DD} = 48\text{ V}, I_{DQ} = 2000\text{ mA}, f1 = 1000.0\text{ MHz}, f2 = 1000.1\text{ MHz}, P_{OUT} = 50\text{ W PEP}$ |
| Output Mismatch Stress | VSWR | 10:1 | - | - | - | No damage at all phase angles $V_{DD} = 48\text{ V}, I_{DQ} = 2000\text{ mA}, f = 1000\text{ MHz}, P_{OUT} = 50\text{ W CW}$ |
| Dynamic Characteristics | | | | | | |
| Input Capacitance | C_{DS} | - | 9.5 | - | pF | $V_{DS} = 48\text{ V}, V_{GS} = -16\text{ V}, f = 1\text{ MHz}$ |
| Output Capacitance | C_{GS} | - | 6.5 | - | pF | $V_{DS} = 48\text{ V}, V_{GS} = -16\text{ V}, f = 1\text{ MHz}$ |
| Reverse Transfer Capacitance | C_{GD} | - | 2.2 | - | pF | $V_{DS} = 48\text{ V}, V_{GS} = -16\text{ V}, f = 1\text{ MHz}$ |

Notes:

¹ Drain Efficiency = P_{OUT}/P_{DC}

² Power Added Efficiency (PAE) = $(P_{OUT} - P_{IN}) / P_{DC}$

DIE Dimensions (units in microns)



Overall die size 5260 x 1195 microns, die thickness 100 microns
All pads must be bonded for electrical connection.

Assembly Notes:

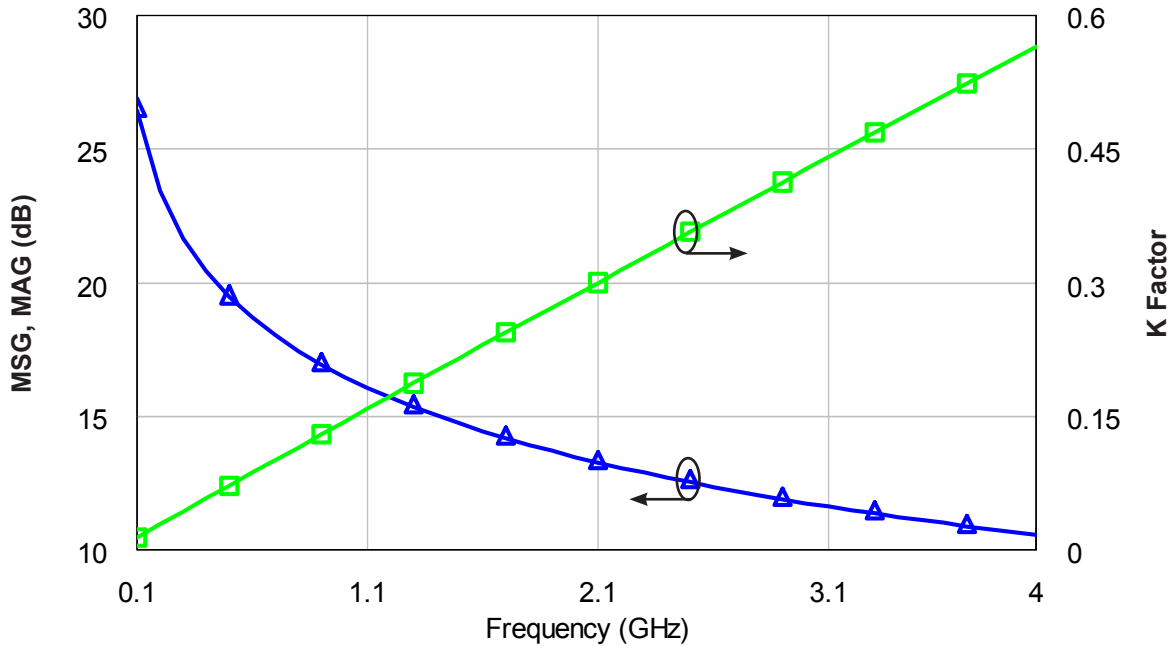
- Recommended solder is AuSn (80/20) solder. Refer to Cree's website for the Eutectic Die Bond Procedure application note at www.cree.com/wireless.
- Vacuum collet is the preferred method of pick-up.
- The backside of the die is the source (ground) contact.
- Use the die label for the correct orientation.
- Die back side plating is 5 microns thick gold minimum.
- Use caution to prevent air bridge damage.
- Thermosonic ball or wedge bonding is the preferred connection method.
- Gold wire shall be used for connections.
- Use caution not to probe on the vias.



Typical Performance

Maximum Stable Gain, Maximum Available Gain and K Factor of the CRF24060D

$$V_{DD} = 48 \text{ V}, I_{DQ} = 2000 \text{ mA}$$



Intrinsic die parameters - reference planes at centers of gate and drain bonding pads. No wire bonds assumed.



Typical Die S-Parameters (Small Signal, $V_{DS} = 48\text{ V}$, $I_{DQ} = 500\text{ mA}$, magnitude / angle)

| Frequency | S(1,1) | S(2,1) | S(1,2) | S(2,2) |
|-----------|-------------------|------------------|---------------------|-------------------|
| 100.0MHz | 0.95715 / -101.01 | 8.9085 / 126.61 | 0.027027 / 37.088 | 0.71294 / -169.08 |
| 200.0MHz | 0.93931 / -135.11 | 5.2813 / 107.99 | 0.032043 / 18.949 | 0.77416 / -172.52 |
| 300.0MHz | 0.93437 / -149.10 | 3.6570 / 99.343 | 0.033278 / 10.779 | 0.79111 / -174.23 |
| 400.0MHz | 0.93262 / -156.47 | 2.7776 / 93.930 | 0.033695 / 5.8455 | 0.79825 / -175.06 |
| 500.0MHz | 0.93198 / -160.96 | 2.2320 / 89.916 | 0.033837 / 2.3103 | 0.80238 / -175.48 |
| 600.0MHz | 0.93183 / -163.98 | 1.8616 / 86.629 | 0.033856 / -0.49809 | 0.80539 / -175.68 |
| 700.0MHz | 0.93197 / -166.13 | 1.5938 / 83.770 | 0.033805 / -2.8795 | 0.80797 / -175.74 |
| 800.0MHz | 0.93227 / -167.74 | 1.3912 / 81.184 | 0.033710 / -4.9867 | 0.81040 / -175.74 |
| 900.0MHz | 0.93270 / -168.98 | 1.2324 / 78.789 | 0.033581 / -6.9049 | 0.81283 / -175.68 |
| 1.000GHz | 0.93323 / -169.97 | 1.1046 / 76.531 | 0.033425 / -8.6855 | 0.81530 / -175.60 |
| 1.100GHz | 0.93384 / -170.77 | 0.99935 / 74.378 | 0.033248 / -10.361 | 0.81787 / -175.49 |
| 1.200GHz | 0.93451 / -171.44 | 0.91118 / 72.310 | 0.033050 / -11.953 | 0.82052 / -175.38 |
| 1.300GHz | 0.93524 / -171.99 | 0.83618 / 70.311 | 0.032836 / -13.475 | 0.82328 / -175.26 |
| 1.400GHz | 0.93602 / -172.47 | 0.77156 / 68.372 | 0.032607 / -14.939 | 0.82613 / -175.14 |
| 1.500GHz | 0.93684 / -172.88 | 0.71528 / 66.484 | 0.032363 / -16.352 | 0.82906 / -175.03 |
| 1.600GHz | 0.93770 / -173.24 | 0.66580 / 64.643 | 0.032107 / -17.719 | 0.83207 / -174.91 |
| 1.700GHz | 0.93858 / -173.55 | 0.62194 / 62.844 | 0.031840 / -19.044 | 0.83515 / -174.80 |
| 1.800GHz | 0.93949 / -173.83 | 0.58280 / 61.085 | 0.031563 / -20.330 | 0.83828 / -174.70 |
| 1.900GHz | 0.94042 / -174.09 | 0.54764 / 59.362 | 0.031277 / -21.580 | 0.84145 / -174.61 |
| 2.000GHz | 0.94137 / -174.31 | 0.51588 / 57.674 | 0.030983 / -22.796 | 0.84466 / -174.53 |
| 2.100GHz | 0.94233 / -174.52 | 0.48705 / 56.020 | 0.030682 / -23.979 | 0.84789 / -174.45 |
| 2.200GHz | 0.94330 / -174.71 | 0.46076 / 54.397 | 0.030375 / -25.131 | 0.85112 / -174.38 |
| 2.300GHz | 0.94427 / -174.88 | 0.43669 / 52.806 | 0.030062 / -26.253 | 0.85437 / -174.32 |
| 2.400GHz | 0.94525 / -175.05 | 0.41458 / 51.245 | 0.029746 / -27.345 | 0.85760 / -174.27 |
| 2.500GHz | 0.94622 / -175.20 | 0.39420 / 49.713 | 0.029426 / -28.409 | 0.86082 / -174.23 |
| 2.600GHz | 0.94720 / -175.34 | 0.37536 / 48.209 | 0.029103 / -29.446 | 0.86401 / -174.19 |
| 2.700GHz | 0.94816 / -175.47 | 0.35790 / 46.734 | 0.028778 / -30.456 | 0.86718 / -174.17 |
| 2.800GHz | 0.94912 / -175.60 | 0.34167 / 45.285 | 0.028451 / -31.439 | 0.87031 / -174.15 |
| 2.900GHz | 0.95007 / -175.72 | 0.32656 / 43.863 | 0.028124 / -32.397 | 0.87340 / -174.13 |
| 3.000GHz | 0.95101 / -175.84 | 0.31245 / 42.467 | 0.027796 / -33.330 | 0.87644 / -174.13 |
| 3.100GHz | 0.95194 / -175.95 | 0.29926 / 41.096 | 0.027468 / -34.239 | 0.87944 / -174.13 |
| 3.200GHz | 0.95286 / -176.06 | 0.28691 / 39.749 | 0.027141 / -35.124 | 0.88238 / -174.14 |
| 3.300GHz | 0.95375 / -176.16 | 0.27532 / 38.428 | 0.026815 / -35.987 | 0.88526 / -174.15 |
| 3.400GHz | 0.95464 / -176.26 | 0.26442 / 37.129 | 0.026491 / -36.826 | 0.88809 / -174.17 |
| 3.500GHz | 0.95550 / -176.36 | 0.25417 / 35.854 | 0.026168 / -37.644 | 0.89086 / -174.19 |
| 3.600GHz | 0.95635 / -176.45 | 0.24451 / 34.601 | 0.025848 / -38.440 | 0.89357 / -174.22 |
| 3.700GHz | 0.95719 / -176.54 | 0.23539 / 33.371 | 0.025530 / -39.215 | 0.89622 / -174.25 |
| 3.800GHz | 0.95800 / -176.63 | 0.22678 / 32.162 | 0.025215 / -39.970 | 0.89880 / -174.28 |
| 3.900GHz | 0.95880 / -176.72 | 0.21864 / 30.974 | 0.024902 / -40.705 | 0.90132 / -174.32 |
| 4.000GHz | 0.95958 / -176.80 | 0.21093 / 29.807 | 0.024593 / -41.421 | 0.90378 / -174.36 |



Typical Die S-Parameters (Small Signal, $V_{DS} = 48\text{ V}$, $I_{DQ} = 1000\text{ mA}$, magnitude / angle)

| Frequency | S(1,1) | S(2,1) | S(1,2) | S(2,2) |
|-----------|-------------------|------------------|---------------------|-------------------|
| 100.0MHz | 0.95891 / -104.19 | 9.3337 / 125.32 | 0.024361 / 35.778 | 0.74246 / -170.26 |
| 200.0MHz | 0.94349 / -137.38 | 5.4630 / 107.34 | 0.028516 / 18.252 | 0.79756 / -173.48 |
| 300.0MHz | 0.93935 / -150.77 | 3.7704 / 99.161 | 0.029518 / 10.533 | 0.81232 / -175.04 |
| 400.0MHz | 0.93788 / -157.79 | 2.8610 / 94.100 | 0.029859 / 5.9282 | 0.81839 / -175.81 |
| 500.0MHz | 0.93731 / -162.07 | 2.2987 / 90.374 | 0.029982 / 2.6594 | 0.82178 / -176.21 |
| 600.0MHz | 0.93715 / -164.94 | 1.9177 / 87.339 | 0.030008 / 0.081238 | 0.82416 / -176.41 |
| 700.0MHz | 0.93721 / -166.99 | 1.6427 / 84.708 | 0.029981 / -2.0930 | 0.82613 / -176.50 |
| 800.0MHz | 0.93740 / -168.52 | 1.4349 / 82.336 | 0.029919 / -4.0091 | 0.82795 / -176.52 |
| 900.0MHz | 0.93770 / -169.71 | 1.2723 / 80.140 | 0.029832 / -5.7489 | 0.82974 / -176.50 |
| 1.000GHz | 0.93807 / -170.65 | 1.1414 / 78.072 | 0.029725 / -7.3612 | 0.83155 / -176.44 |
| 1.100GHz | 0.93850 / -171.42 | 1.0338 / 76.100 | 0.029602 / -8.8773 | 0.83342 / -176.37 |
| 1.200GHz | 0.93898 / -172.06 | 0.94374 / 74.205 | 0.029463 / -10.318 | 0.83535 / -176.28 |
| 1.300GHz | 0.93951 / -172.60 | 0.86715 / 72.371 | 0.029312 / -11.696 | 0.83736 / -176.19 |
| 1.400GHz | 0.94008 / -173.05 | 0.80122 / 70.589 | 0.029149 / -13.024 | 0.83945 / -176.10 |
| 1.500GHz | 0.94068 / -173.45 | 0.74382 / 68.853 | 0.028975 / -14.306 | 0.84162 / -176.00 |
| 1.600GHz | 0.94131 / -173.79 | 0.69339 / 67.156 | 0.028791 / -15.549 | 0.84385 / -175.90 |
| 1.700GHz | 0.94198 / -174.09 | 0.64870 / 65.495 | 0.028598 / -16.757 | 0.84614 / -175.81 |
| 1.800GHz | 0.94266 / -174.36 | 0.60882 / 63.866 | 0.028397 / -17.933 | 0.84849 / -175.72 |
| 1.900GHz | 0.94337 / -174.60 | 0.57301 / 62.269 | 0.028188 / -19.079 | 0.85090 / -175.63 |
| 2.000GHz | 0.94409 / -174.82 | 0.54066 / 60.699 | 0.028188 / -19.079 | 0.85334 / -175.55 |
| 2.100GHz | 0.94483 / -175.02 | 0.51128 / 59.158 | 0.027749 / -21.287 | 0.85582 / -175.47 |
| 2.200GHz | 0.94483 / -175.02 | 0.48449 / 57.642 | 0.027521 / -22.352 | 0.85833 / -175.40 |
| 2.300GHz | 0.94634 / -175.36 | 0.45996 / 56.151 | 0.027288 / -23.393 | 0.86086 / -175.34 |
| 2.400GHz | 0.94711 / -175.52 | 0.43741 / 54.685 | 0.027050 / -24.410 | 0.86340 / -175.28 |
| 2.500GHz | 0.94789 / -175.66 | 0.41661 / 53.243 | 0.026809 / -25.404 | 0.86595 / -175.23 |
| 2.600GHz | 0.94867 / -175.79 | 0.39737 / 51.824 | 0.026563 / -26.376 | 0.86851 / -175.18 |
| 2.700GHz | 0.94945 / -175.92 | 0.37952 / 50.427 | 0.026315 / -27.326 | 0.87106 / -175.14 |
| 2.800GHz | 0.95023 / -176.03 | 0.36291 / 49.052 | 0.026064 / -28.254 | 0.87360 / -175.10 |
| 2.900GHz | 0.95101 / -176.15 | 0.34743 / 47.699 | 0.025812 / -29.162 | 0.87614 / -175.08 |
| 3.000GHz | 0.95178 / -176.25 | 0.33297 / 46.367 | 0.025557 / -30.049 | 0.87865 / -175.05 |
| 3.100GHz | 0.95255 / -176.35 | 0.31943 / 45.056 | 0.025301 / -30.916 | 0.88114 / -175.03 |
| 3.200GHz | 0.95332 / -176.45 | 0.30672 / 43.766 | 0.025045 / -31.764 | 0.88361 / -175.02 |
| 3.300GHz | 0.95407 / -176.55 | 0.29479 / 42.496 | 0.024788 / -32.592 | 0.88605 / -175.01 |
| 3.400GHz | 0.95482 / -176.64 | 0.28356 / 41.245 | 0.024530 / -33.401 | 0.88845 / -175.01 |
| 3.500GHz | 0.95557 / -176.72 | 0.27298 / 40.014 | 0.024273 / -34.192 | 0.89083 / -175.01 |
| 3.600GHz | 0.95630 / -176.81 | 0.26299 / 38.802 | 0.024016 / -34.965 | 0.89317 / -175.02 |
| 3.700GHz | 0.95702 / -176.89 | 0.25355 / 37.609 | 0.023760 / -35.720 | 0.89547 / -175.03 |
| 3.800GHz | 0.95773 / -176.97 | 0.24461 / 36.434 | 0.023505 / -36.458 | 0.89773 / -175.04 |
| 3.900GHz | 0.95843 / -177.05 | 0.23615 / 35.277 | 0.023251 / -37.179 | 0.89995 / -175.06 |
| 4.000GHz | 0.95843 / -177.05 | 0.22813 / 34.138 | 0.022998 / -37.883 | 0.90213 / -175.08 |



Typical Die S-Parameters (Small Signal, $V_{DS} = 48\text{ V}$, $I_{DQ} = 2000\text{ mA}$, magnitude / angle)

| Frequency | S(1,1) | S(2,1) | S(1,2) | S(2,2) |
|-----------|-------------------|------------------|--------------------|-------------------|
| 100.0MHz | 0.95949 / -108.95 | 9.9164 / 123.17 | 0.022412 / 33.611 | 0.76603 / -170.90 |
| 200.0MHz | 0.94641 / -140.66 | 5.6948 / 106.07 | 0.025741 / 16.953 | 0.81571 / -174.11 |
| 300.0MHz | 0.94306 / -153.13 | 3.9112 / 98.475 | 0.026515 / 9.7970 | 0.82842 / -175.59 |
| 400.0MHz | 0.94188 / -159.63 | 2.9628 / 93.803 | 0.026777 / 5.5651 | 0.83354 / -176.32 |
| 500.0MHz | 0.94142 / -163.58 | 2.3791 / 90.373 | 0.026873 / 2.5747 | 0.83633 / -176.71 |
| 600.0MHz | 0.94128 / -166.23 | 1.9846 / 87.581 | 0.026894 / 0.22293 | 0.83826 / -176.91 |
| 700.0MHz | 0.94132 / -168.12 | 1.7004 / 85.161 | 0.026876 / -1.7569 | 0.83982 / -177.01 |
| 800.0MHz | 0.94146 / -169.53 | 1.4858 / 82.978 | 0.026831 / -3.5000 | 0.84124 / -177.05 |
| 900.0MHz | 0.94168 / -170.63 | 1.3180 / 80.956 | 0.026767 / -5.0819 | 0.84262 / -177.04 |
| 1.000GHz | 0.94196 / -171.51 | 1.1832 / 79.051 | 0.026688 / -6.5481 | 0.84401 / -177.01 |
| 1.100GHz | 0.94228 / -172.22 | 1.0724 / 77.232 | 0.026597 / -7.9274 | 0.84545 / -176.96 |
| 1.200GHz | 0.94265 / -172.81 | 0.97967 / 75.482 | 0.026494 / -9.2389 | 0.84693 / -176.89 |
| 1.300GHz | 0.94306 / -173.31 | 0.90091 / 73.786 | 0.026382 / -10.496 | 0.84848 / -176.82 |
| 1.400GHz | 0.94349 / -173.73 | 0.83314 / 72.136 | 0.026260 / -11.707 | 0.85009 / -176.74 |
| 1.500GHz | 0.94396 / -174.10 | 0.77418 / 70.526 | 0.026129 / -12.879 | 0.85176 / -176.66 |
| 1.600GHz | 0.94445 / -174.42 | 0.72239 / 68.950 | 0.025991 / -14.018 | 0.85349 / -176.58 |
| 1.700GHz | 0.94497 / -174.70 | 0.67653 / 67.404 | 0.025845 / -15.126 | 0.85528 / -176.50 |
| 1.800GHz | 0.94550 / -174.95 | 0.63562 / 65.887 | 0.025693 / -16.207 | 0.85713 / -176.42 |
| 1.900GHz | 0.94606 / -175.17 | 0.59888 / 64.395 | 0.025534 / -17.262 | 0.85902 / -176.34 |
| 2.000GHz | 0.94663 / -175.37 | 0.56570 / 62.927 | 0.025369 / -18.294 | 0.86095 / -176.27 |
| 2.100GHz | 0.94722 / -175.55 | 0.53557 / 61.482 | 0.025199 / -19.304 | 0.86293 / -176.19 |
| 2.200GHz | 0.94782 / -175.72 | 0.50810 / 60.059 | 0.025024 / -20.292 | 0.86493 / -176.13 |
| 2.300GHz | 0.94843 / -175.87 | 0.48294 / 58.656 | 0.024844 / -21.260 | 0.86697 / -176.06 |
| 2.400GHz | 0.94905 / -176.01 | 0.45981 / 57.274 | 0.024659 / -22.208 | 0.86903 / -176.01 |
| 2.500GHz | 0.94968 / -176.15 | 0.43848 / 55.911 | 0.024471 / -23.137 | 0.87110 / -175.95 |
| 2.600GHz | 0.95032 / -176.27 | 0.41873 / 54.568 | 0.024280 / -24.048 | 0.87320 / -175.90 |
| 2.700GHz | 0.95096 / -176.38 | 0.40040 / 53.243 | 0.024085 / -24.940 | 0.87530 / -175.86 |
| 2.800GHz | 0.95160 / -176.49 | 0.38335 / 51.937 | 0.023888 / -25.815 | 0.87741 / -175.82 |
| 2.900GHz | 0.95225 / -176.59 | 0.36744 / 50.649 | 0.023688 / -26.672 | 0.87951 / -175.78 |
| 3.000GHz | 0.95290 / -176.69 | 0.35257 / 49.378 | 0.023486 / -27.512 | 0.88162 / -175.75 |
| 3.100GHz | 0.95355 / -176.78 | 0.33863 / 48.125 | 0.023282 / -28.336 | 0.88372 / -175.72 |
| 3.200GHz | 0.95419 / -176.87 | 0.32555 / 46.889 | 0.023077 / -29.143 | 0.88581 / -175.70 |
| 3.300GHz | 0.95484 / -176.95 | 0.31325 / 45.670 | 0.022870 / -29.934 | 0.88789 / -175.68 |
| 3.400GHz | 0.95548 / -177.04 | 0.30167 / 44.467 | 0.022663 / -30.708 | 0.88996 / -175.67 |
| 3.500GHz | 0.95611 / -177.11 | 0.29074 / 43.281 | 0.022454 / -31.468 | 0.89201 / -175.66 |
| 3.600GHz | 0.95674 / -177.19 | 0.28042 / 42.112 | 0.022245 / -32.211 | 0.89404 / -175.65 |
| 3.700GHz | 0.95737 / -177.26 | 0.27065 / 40.958 | 0.022036 / -32.940 | 0.89605 / -175.65 |
| 3.800GHz | 0.95799 / -177.34 | 0.26140 / 39.820 | 0.021827 / -33.654 | 0.89803 / -175.65 |
| 3.900GHz | 0.95861 / -177.41 | 0.25263 / 38.697 | 0.021618 / -34.353 | 0.89999 / -175.66 |
| 4.000GHz | 0.95921 / -177.47 | 0.24430 / 37.590 | 0.021410 / -35.037 | 0.90192 / -175.66 |



Disclaimer

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