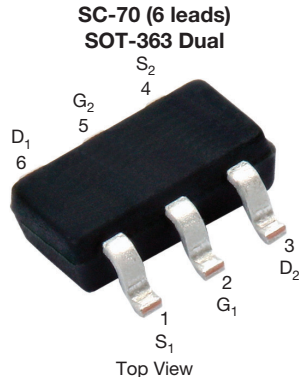


## Dual N-Channel 20 V (D-S) MOSFET



Marking Code: PA

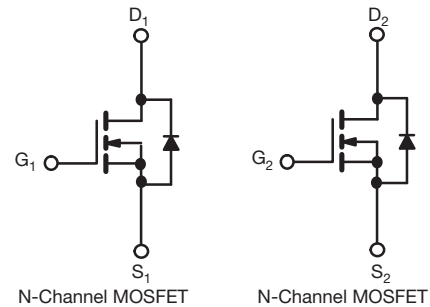
| PRODUCT SUMMARY                                    |       |
|--|-------|
| $V_{DS}$ (V)                                       | 20    |
| $R_{DS(on)}$ max. ( $\Omega$ ) at $V_{GS} = 4.5$ V | 0.385 |
| $R_{DS(on)}$ max. ( $\Omega$ ) at $V_{GS} = 2.5$ V | 0.630 |
| $Q_g$ typ. (nC)                                    | 0.8   |
| $I_D$ (A) <sup>f</sup>                             | 0.70  |
| Configuration                                      | Dual  |

### FEATURES

- TrenchFET<sup>®</sup> power MOSFETs: 2.5 V rated
- 100%  $R_g$  tested
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
Available



| ORDERING INFORMATION              |                 |
|-----------------------------------|-----------------|
| Package                           | SC-70           |
| Lead (Pb)-free with Tape and Reel | Si1902DL-T1-E3  |
| Lead (Pb)-free and halogen-free   | Si1902DL-T1-GE3 |

| ABSOLUTE MAXIMUM RATINGS ( $T_A = 25$ °C, unless otherwise noted) |                |               |      |
|---|----------------|---------------|------|
| PARAMETER   | SYMBOL         | LIMIT         | UNIT |
| Drain-source voltage  | $V_{DS}$       | 20            | V    |
| Gate-source voltage   | $V_{GS}$       | $\pm 12$      |      |
| Continuous drain current ( $T_J = 150$ °C) <sup>a</sup>           | $I_D$          | $T_A = 25$ °C | 0.66 |
|   |                | $T_A = 85$ °C | 0.48 |
| Pulsed drain current  | $I_{DM}$       | 1             | A    |
| Continuous source current (diode conduction) <sup>a</sup>         | $I_S$          | 0.23          |      |
| Maximum power dissipation <sup>a</sup>                            | $P_D$          | $T_A = 25$ °C | 0.27 |
|   |                | $T_A = 85$ °C | 0.14 |
| Operating junction and storage temperature range                  | $T_J, T_{stg}$ | -55 to +150   | °C   |

| THERMAL RESISTANCE RATINGS               |            |              |         |      |
|--|------------|--------------|---------|------|
| PARAMETER                                | SYMBOL     | TYPICAL      | MAXIMUM | UNIT |
| Maximum junction-to-ambient <sup>a</sup> | $R_{thJA}$ | $t \leq 5$ s | 360     | °C/W |
|  |            | Steady state | 400     |      |
| Maximum junction-to-foot (drain)         | $R_{thJF}$ | 300          | 350     |      |

#### Note

a. Surface Mounted on 1" x 1" FR4 board



| SPECIFICATIONS (T <sub>J</sub> = 25 °C, unless otherwise noted) |                     |   |      |       |       |      |
|---|---------------------|---|------|-------|-------|------|
| PARAMETER   | SYMBOL              | TEST CONDITIONS   | MIN. | TYP.  | MAX.  | UNIT |
| <b>Static</b>   |                     |   |      |       |       |      |
| Gate threshold voltage  | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA   | 0.6  | -     | 1.5   | V    |
| Gate-body leakage   | I <sub>GSS</sub>    | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±12 V  | -    | -     | ±100  | nA   |
| Zero gate voltage drain current                                 | I <sub>DSS</sub>    | V <sub>DS</sub> = 16 V, V <sub>GS</sub> = 0 V   | -    | -     | 1     | μA   |
|   |                     | V <sub>DS</sub> = 16 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 85°C  | -    | -     | 5     |      |
| On-state drain current <sup>a</sup>                             | I <sub>D(on)</sub>  | V <sub>DS</sub> = 5 V, V <sub>GS</sub> = 4.5 V  | 1    | -     | -     | A    |
| Drain-source on-state resistance <sup>a</sup>                   | R <sub>DS(on)</sub> | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 0.66 A  | -    | 0.320 | 0.385 | Ω    |
|   |                     | V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 0.40 A  | -    | 0.560 | 0.630 |      |
| Forward transconductance <sup>a</sup>                           | g <sub>fs</sub>     | V <sub>DS</sub> = 10 V, I <sub>D</sub> = 0.66 A   | -    | 1.5   | -     | S    |
| Diode forward voltage <sup>a</sup>                              | V <sub>SD</sub>     | I <sub>S</sub> = 0.23 A, V <sub>GS</sub> = 0 V  | -    | 0.8   | 1.2   | V    |
| <b>Dynamic <sup>b</sup></b>                                     |                     |   |      |       |       |      |
| Total gate charge   | Q <sub>g</sub>      | V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 0.66 A  | -    | 0.8   | 1.2   | nC   |
| Gate-source charge  | Q <sub>gs</sub>     |   | -    | 0.06  | -     |      |
| Gate-drain charge   | Q <sub>gd</sub>     |   | -    | 0.30  | -     |      |
| Gate resistance   | R <sub>g</sub>      | f = 1 MHz   | 0.2  | 1     | 1.7   | Ω    |
| Turn-on delay time  | t <sub>d(on)</sub>  | V <sub>DD</sub> = 10 V, R <sub>L</sub> = 20 Ω<br>I <sub>D</sub> ≅ 0.5 A, V <sub>GEN</sub> = 4.5 V, R <sub>g</sub> = 6 Ω | -    | 10    | 20    | ns   |
| Rise time   | t <sub>r</sub>      |   | -    | 16    | 30    |      |
| Turn-off delay time   | t <sub>d(off)</sub> |   | -    | 10    | 20    |      |
| Fall time   | t <sub>f</sub>      |   | -    | 10    | 20    |      |
| Source-drain reverse recovery time                              | t <sub>rr</sub>     | I <sub>F</sub> = 0.23 A, dI/dt = 100 A/μs   | -    | 20    | 40    |      |

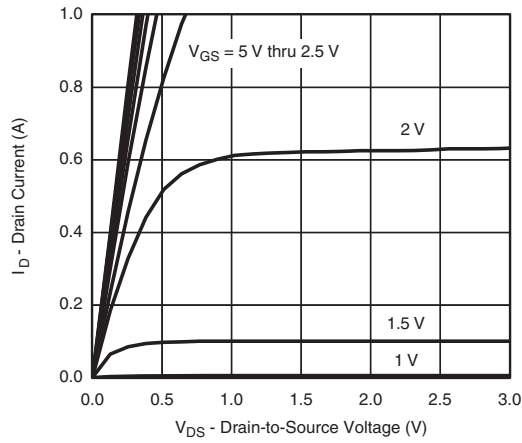
**Notes**

- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%  
b. Guaranteed by design, not subject to production testing

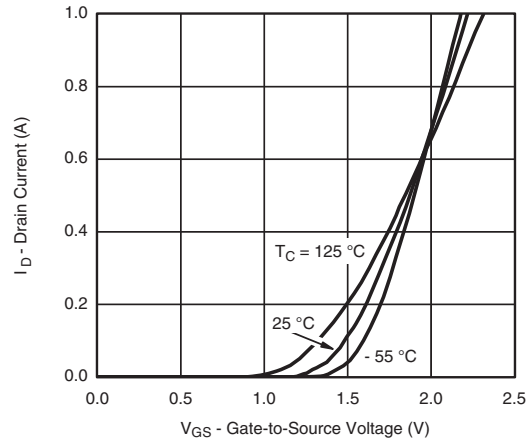
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



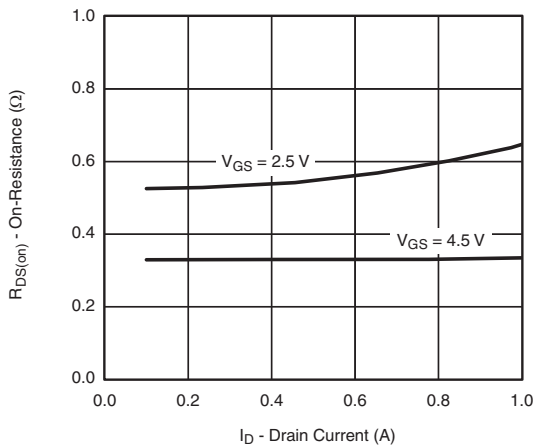
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



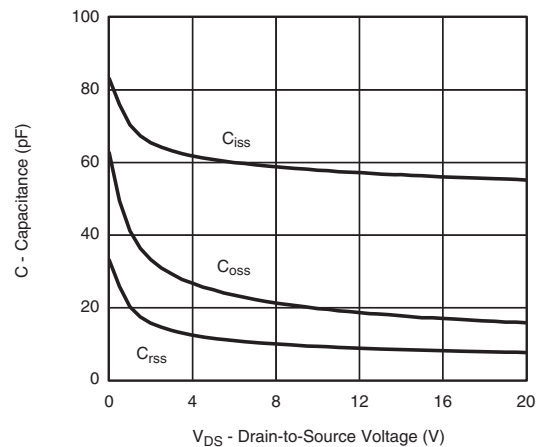
Output Characteristics



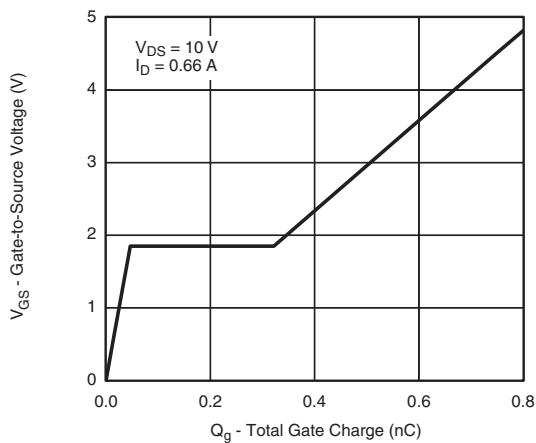
Transfer Characteristics



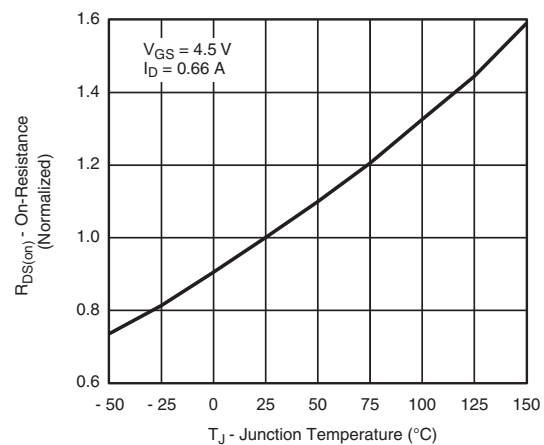
On-Resistance vs. Drain Current



Capacitance



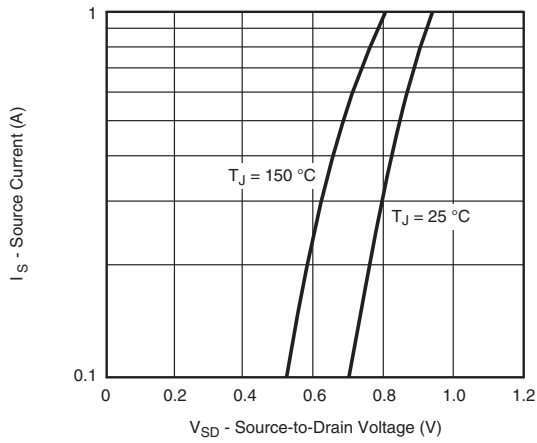
Gate Charge



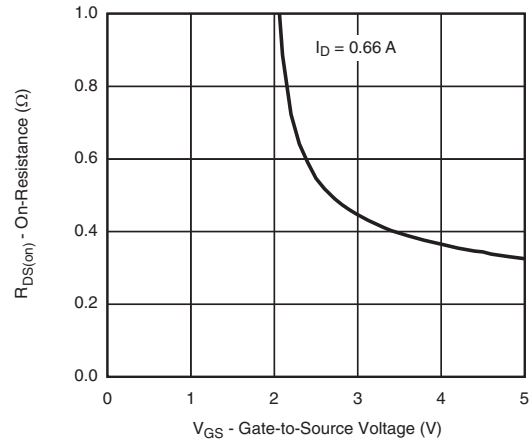
On-Resistance vs. Junction Temperature



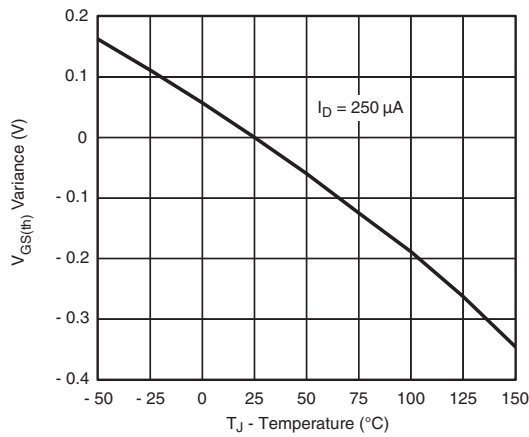
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



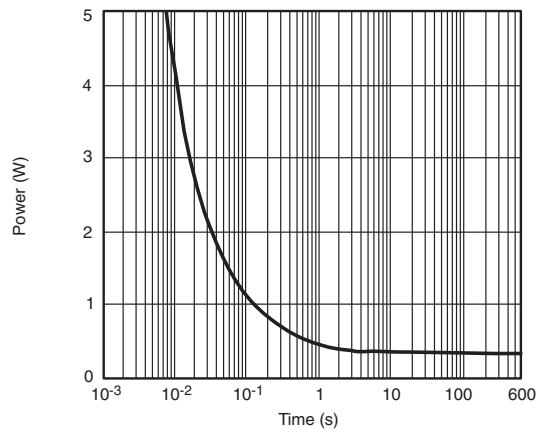
**Surge-Drain Diode Forward Voltage**



**On-Resistance vs. Gate-to-Source Voltage**



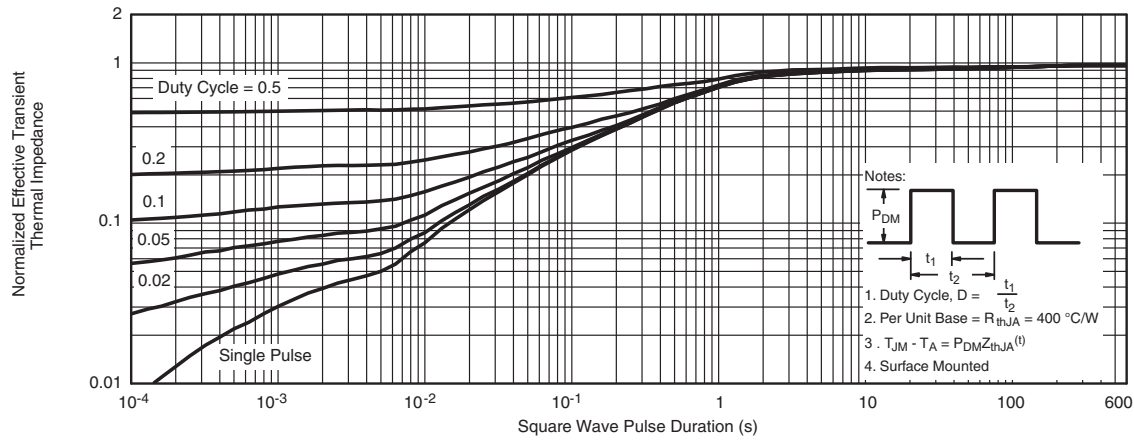
**Threshold Voltage**



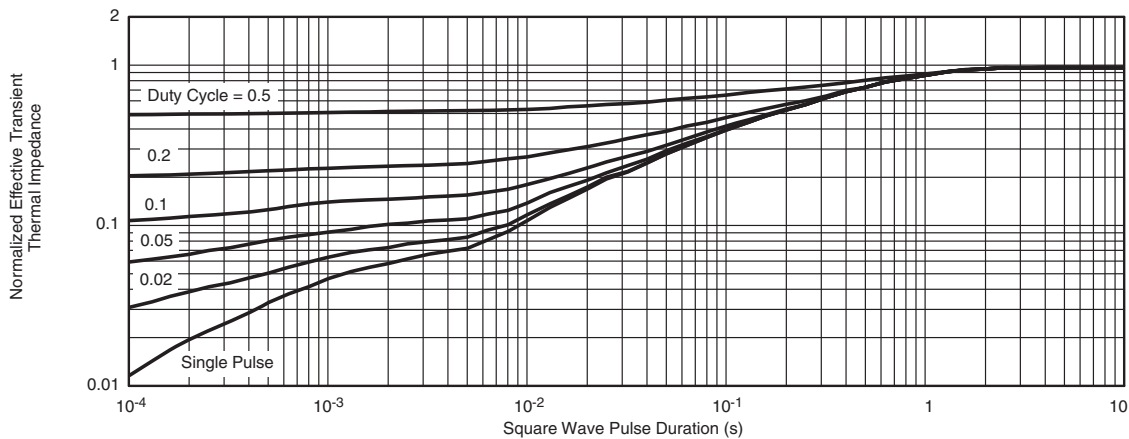
**Single Pulse Power, Junction-to-Ambient**



**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



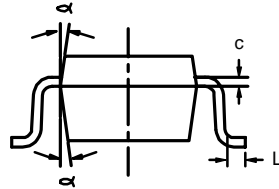
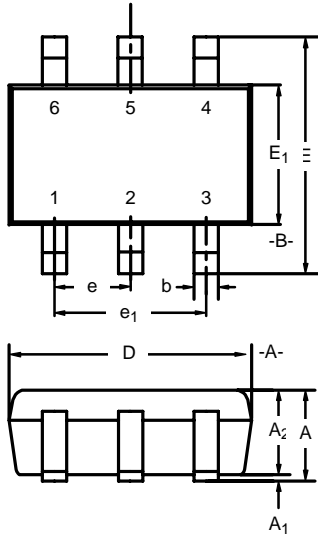
**Normalized Thermal Transient Impedance, Junction-to-Ambient**



**Normalized Thermal Transient Impedance, Junction-to-Foot**

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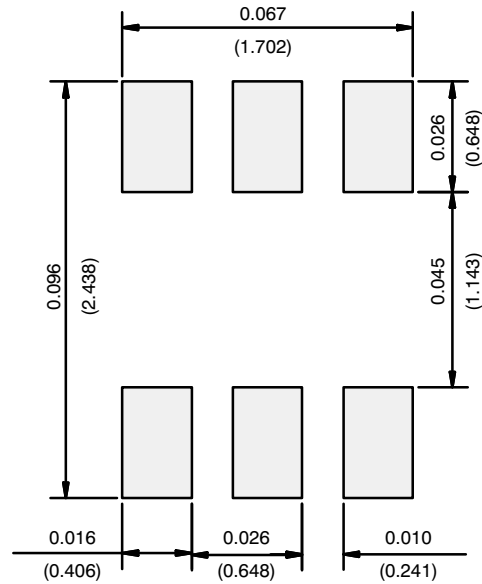
### SC-70: 6-LEADS



| Dim            | MILLIMETERS |      |      | INCHES   |       |       |
|----------------|-------------|------|------|----------|-------|-------|
|                | Min         | Nom  | Max  | Min      | Nom   | Max   |
| A              | 0.90        | -    | 1.10 | 0.035    | -     | 0.043 |
| A <sub>1</sub> | -           | -    | 0.10 | -        | -     | 0.004 |
| A <sub>2</sub> | 0.80        | -    | 1.00 | 0.031    | -     | 0.039 |
| b              | 0.15        | -    | 0.30 | 0.006    | -     | 0.012 |
| c              | 0.10        | -    | 0.25 | 0.004    | -     | 0.010 |
| D              | 1.80        | 2.00 | 2.20 | 0.071    | 0.079 | 0.087 |
| E              | 1.80        | 2.10 | 2.40 | 0.071    | 0.083 | 0.094 |
| E <sub>1</sub> | 1.15        | 1.25 | 1.35 | 0.045    | 0.049 | 0.053 |
| e              | 0.65BSC     |      |      | 0.026BSC |       |       |
| e <sub>1</sub> | 1.20        | 1.30 | 1.40 | 0.047    | 0.051 | 0.055 |
| L              | 0.10        | 0.20 | 0.30 | 0.004    | 0.008 | 0.012 |
| α              | 7°Nom       |      |      | 7°Nom    |       |       |

ECN: S-03946—Rev. B, 09-Jul-01  
DWG: 5550

## RECOMMENDED MINIMUM PADS FOR SC-70: 6-Lead



Recommended Minimum Pads  
Dimensions in Inches/(mm)

[Return to Index](#)



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