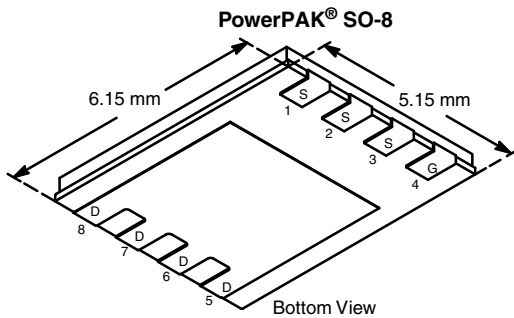


N-Channel 60 V (D-S) MOSFET

| PRODUCT SUMMARY | | | |
|---------------------|-----------------------------------|--------------------|-----------------------|
| V _{DS} (V) | R _{DS(on)} (Ω) Max. | I _D (A) | Q _g (Typ.) |
| 60 | 0.0048 at V _{GS} = 10 V | 60 ^a | 18.5 nC |
| | 0.0060 at V _{GS} = 6 V | 60 ^a | |
| | 0.0078 at V _{GS} = 4.5 V | 60 ^a | |



Ordering Information:
SiR670DP-T1-GE3 (Lead (Pb)-free and Halogen-free)

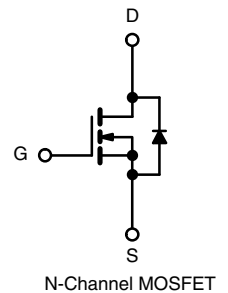
FEATURES

- TrenchFET[®] Power MOSFET
- 100 % R_g and UIS Tested
- Material categorization:
For definitions of compliance please see www.vishay.com/doc?99912



APPLICATIONS

- Primary Side Switching
- Synchronous Rectification
- DC/DC Converters
- Boost Converters
- DC/AC Inverters



ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|--|-----------------------------------|------------------------|----------------------|
| Drain-Source Voltage | V _{DS} | 60 | V |
| Gate-Source Voltage | V _{GS} | ± 20 | V |
| Continuous Drain Current (T _J = 150 °C) | I _D | T _C = 25 °C | 60 ^a |
| | | T _C = 70 °C | 60 ^a |
| | | T _A = 25 °C | 24 ^{b, c} |
| | | T _A = 70 °C | 19.2 ^{b, c} |
| Pulsed Drain Current (t = 100 μs) | I _{DM} | 200 | A |
| Continuous Source-Drain Diode Current | I _S | T _C = 25 °C | 60 ^a |
| | | T _A = 25 °C | 4.5 ^{b, c} |
| Single Pulse Avalanche Current | I _{AS} | 25 | A |
| Single Pulse Avalanche Energy | E _{AS} | 31.2 | mJ |
| Maximum Power Dissipation | P _D | T _C = 25 °C | 56.8 |
| | | T _C = 70 °C | 36.3 |
| | | T _A = 25 °C | 5 ^{b, c} |
| | | T _A = 70 °C | 3.2 ^{b, c} |
| Operating Junction and Storage Temperature Range | T _J , T _{stg} | - 55 to 150 | °C |
| Soldering Recommendations (Peak Temperature) ^{d, e} | | 260 | °C |

THERMAL RESISTANCE RATINGS

| Parameter | Symbol | Typical | Maximum | Unit |
|---|-------------------|---------|---------|------|
| Maximum Junction-to-Ambient ^{b, f} | R _{thJA} | 20 | 25 | °C/W |
| Maximum Junction-to-Case (Drain) | R _{thJC} | 1.8 | 2.2 | °C/W |

Notes:

- Package limited.
- Surface mounted on 1" x 1" FR4 board.
- t = 10 s.
- See solder profile (www.vishay.com/doc?73257). The PowerPAK SO-8 is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.
- Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.
- Maximum under steady state conditions is 65 °C/W.

| SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted) | | | | | | | |
|---|-------------------------|---|--|----------|---|----------------------|-----|
| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit | |
| Static | | | | | | | |
| Drain-Source Breakdown Voltage | V_{DS} | $V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$ | 60 | | | V | |
| V_{DS} Temperature Coefficient | $\Delta V_{DS}/T_J$ | $I_D = 250\text{ }\mu\text{A}$ | | 86 | | mV/ $^\circ\text{C}$ | |
| $V_{GS(th)}$ Temperature Coefficient | $\Delta V_{GS(th)}/T_J$ | | | -5.5 | | | |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$ | 1.5 | | 2.8 | V | |
| Gate-Source Leakage | I_{GSS} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$ | | | ± 100 | nA | |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$ | | | 1 | μA | |
| | | $V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$ | | | 10 | | |
| On-State Drain Current ^a | $I_{D(on)}$ | $V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$ | 30 | | | A | |
| Drain-Source On-State Resistance ^a | $R_{DS(on)}$ | $V_{GS} = 10\text{ V}, I_D = 20\text{ A}$ | | 0.0039 | 0.0048 | Ω | |
| | | $V_{GS} = 6\text{ V}, I_D = 15\text{ A}$ | | 0.0047 | 0.0060 | | |
| | | $V_{GS} = 4.5\text{ V}, I_D = 10\text{ A}$ | | 0.0060 | 0.0078 | | |
| Forward Transconductance ^a | g_{fs} | $V_{DS} = 10\text{ V}, I_D = 20\text{ A}$ | | 60 | | S | |
| Dynamic^b | | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$ | | 2815 | | pF | |
| Output Capacitance | C_{oss} | | | 1050 | | | |
| Reverse Transfer Capacitance | C_{rss} | | | 90 | | | |
| Total Gate Charge | Q_g | $V_{DS} = 30\text{ V}, V_{GS} = 10\text{ V}, I_D = 10\text{ A}$ | | 42 | 63 | nC | |
| | | $V_{DS} = 30\text{ V}, V_{GS} = 6\text{ V}, I_D = 10\text{ A}$ | | 25 | 38 | | |
| Gate-Source Charge | Q_{gs} | $V_{DS} = 30\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 10\text{ A}$ | | 18.5 | 28 | | |
| | | | Gate-Drain Charge | Q_{gd} | | | 8 |
| Output Charge | Q_{oss} | | | | $V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$ | | |
| | | | Gate Resistance | R_g | $f = 1\text{ MHz}$ | | 0.5 |
| Turn-On Delay Time | $t_{d(on)}$ | | $V_{DD} = 30\text{ V}, R_L = 3\text{ }\Omega$ $I_D \cong 10\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$ | | 19 | 38 | ns |
| Rise Time | t_r | | | | 8 | 16 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 31 | 60 | | |
| Fall Time | t_f | | | 7 | 14 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD} = 30\text{ V}, R_L = 3\text{ }\Omega$ $I_D \cong 10\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\text{ }\Omega$ | | 42 | 80 | | |
| Rise Time | t_r | | | 81 | 150 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 28 | 50 | | |
| Fall Time | t_f | | | 8 | 16 | | |
| Drain-Source Body Diode Characteristics | | | | | | | |
| Continuous Source-Drain Diode Current | I_S | $T_C = 25\text{ }^\circ\text{C}$ | | | 60 | A | |
| Pulse Diode Forward Current ($t_p = 100\text{ }\mu\text{s}$) | I_{SM} | | | | 200 | | |
| Body Diode Voltage | V_{SD} | $I_S = 5\text{ A}$ | | 0.78 | 1.1 | V | |
| Body Diode Reverse Recovery Time | t_{rr} | $I_F = 10\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$ | | 40 | 80 | ns | |
| Body Diode Reverse Recovery Charge | Q_{rr} | | | 37 | 74 | nC | |
| Reverse Recovery Fall Time | t_a | | | 18 | | ns | |
| Reverse Recovery Rise Time | t_b | | | 22 | | | |

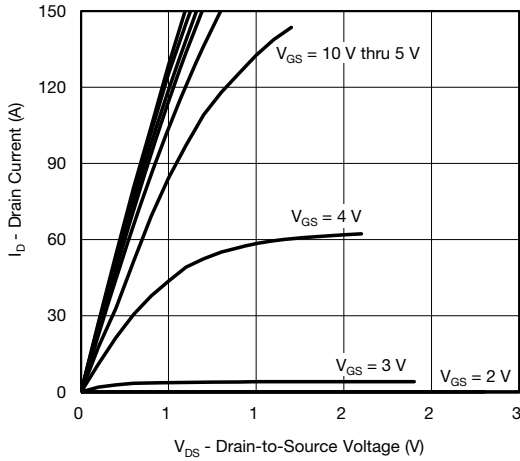
Notes:

a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

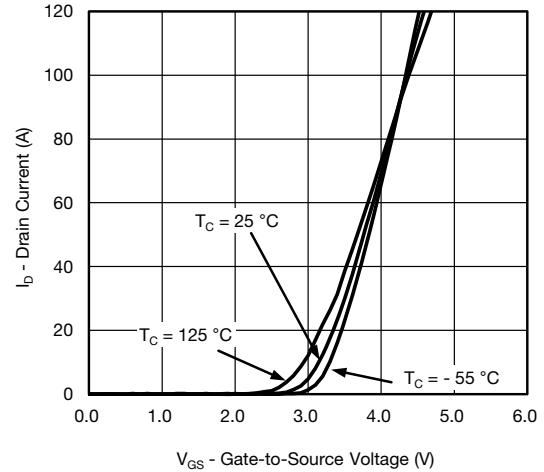
b. Guaranteed by design, not subject to production testing.

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.

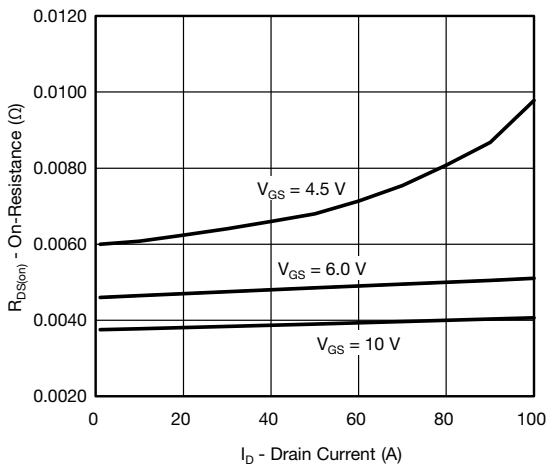
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



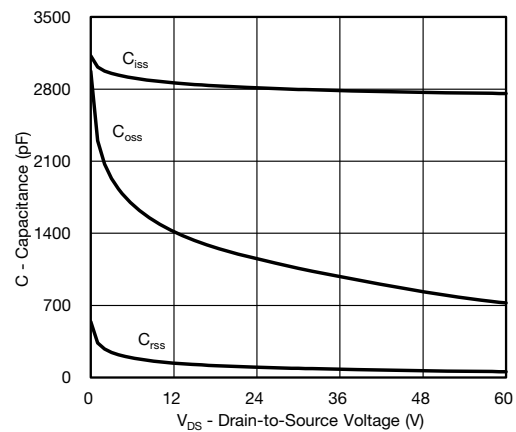
Output Characteristics



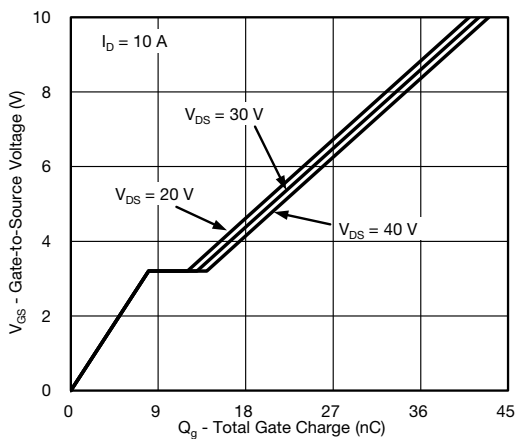
Transfer Characteristics



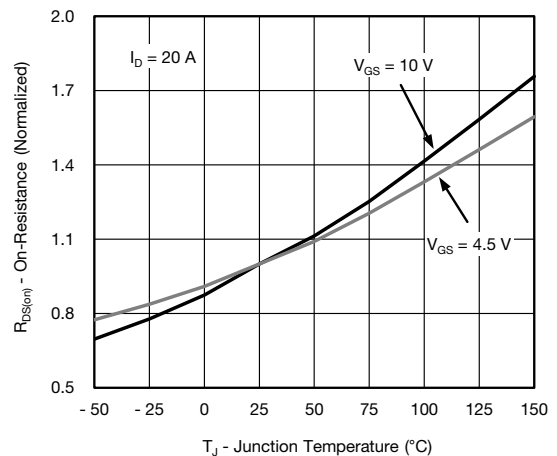
On-Resistance vs. Drain Current



Capacitance

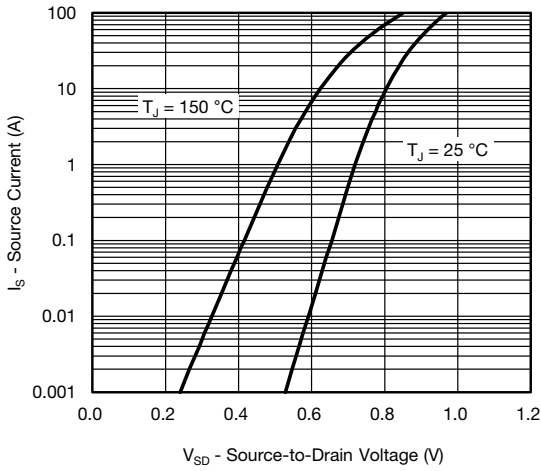


Gate Charge

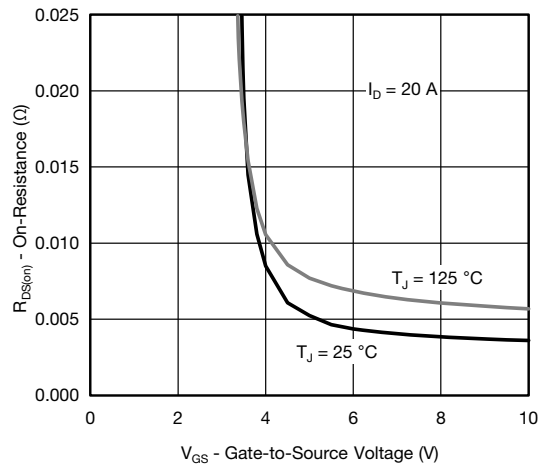


On-Resistance vs. Junction Temperature

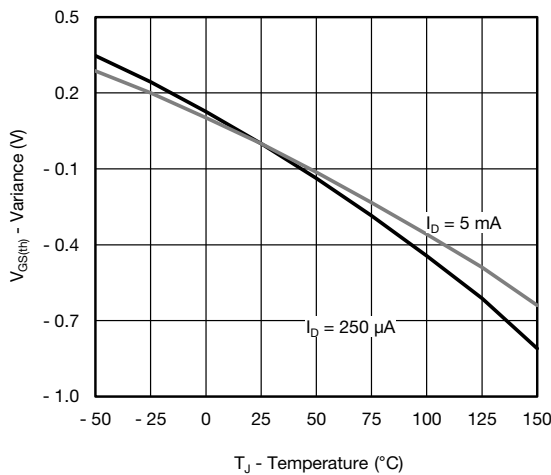
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



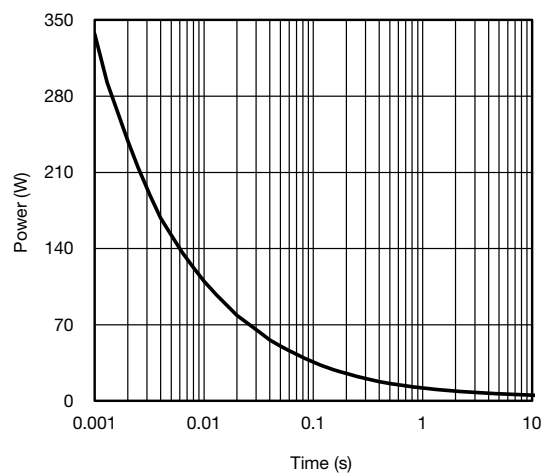
Source-Drain Diode Forward Voltage



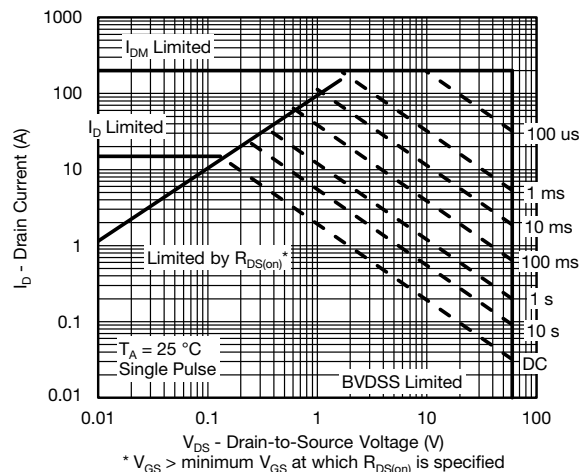
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

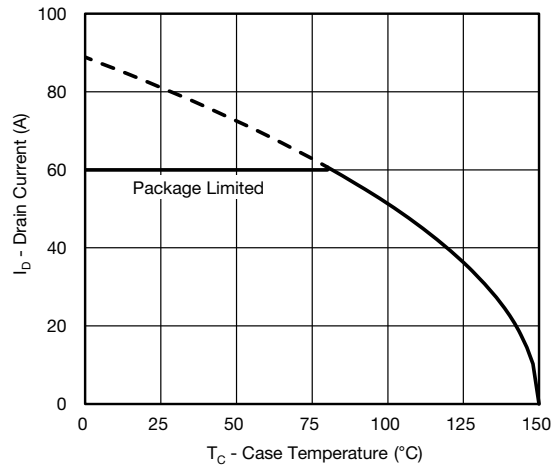


Single Pulse Power, Junction-to-Ambient

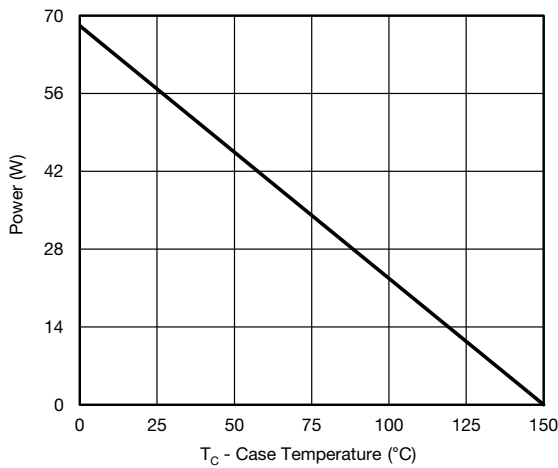


Safe Operating Area, Junction-to-Ambient

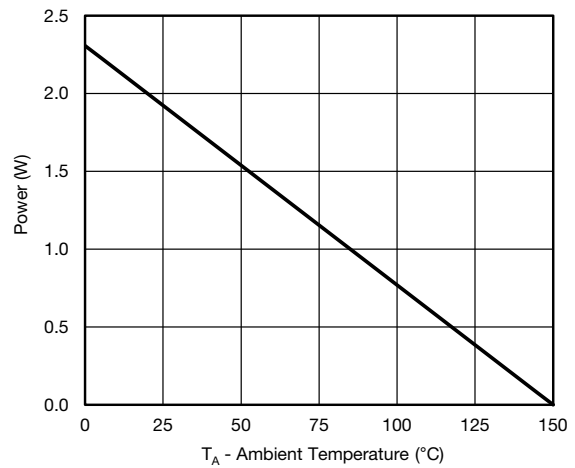
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating*



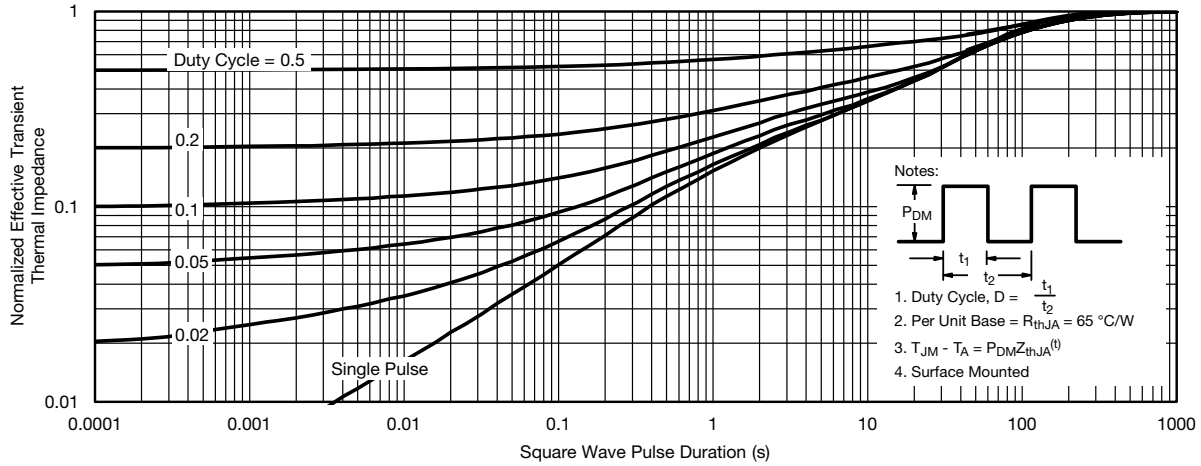
Power, Junction-to-Case



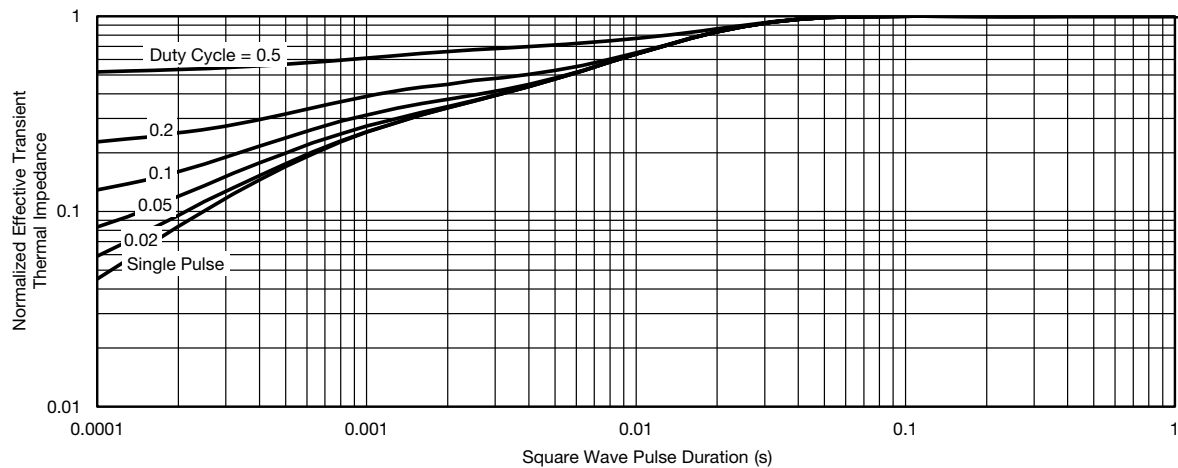
Power, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see www.vishay.com/ppg?62863.

PowerPAK[®] SO-8, (Single/Dual)



- Notes**
1. Inch will govern.
 2. Dimensions exclusive of mold gate burrs.
 3. Dimensions exclusive of mold flash and cutting burrs.

| DIM. | MILLIMETERS | | | INCHES | | |
|---------------------------------|-------------|------|------|-------------|-------|-------|
| | MIN. | NOM. | MAX. | MIN. | NOM. | MAX. |
| A | 0.97 | 1.04 | 1.12 | 0.038 | 0.041 | 0.044 |
| A1 | | - | 0.05 | 0 | - | 0.002 |
| b | 0.33 | 0.41 | 0.51 | 0.013 | 0.016 | 0.020 |
| c | 0.23 | 0.28 | 0.33 | 0.009 | 0.011 | 0.013 |
| D | 5.05 | 5.15 | 5.26 | 0.199 | 0.203 | 0.207 |
| D1 | 4.80 | 4.90 | 5.00 | 0.189 | 0.193 | 0.197 |
| D2 | 3.56 | 3.76 | 3.91 | 0.140 | 0.148 | 0.154 |
| D3 | 1.32 | 1.50 | 1.68 | 0.052 | 0.059 | 0.066 |
| D4 | 0.57 typ. | | | 0.0225 typ. | | |
| D5 | 3.98 typ. | | | 0.157 typ. | | |
| E | 6.05 | 6.15 | 6.25 | 0.238 | 0.242 | 0.246 |
| E1 | 5.79 | 5.89 | 5.99 | 0.228 | 0.232 | 0.236 |
| E2 (for AL product) | 3.30 | 3.48 | 3.66 | 0.130 | 0.137 | 0.144 |
| E2 (for other product) | 3.48 | 3.66 | 3.84 | 0.137 | 0.144 | 0.151 |
| E3 | 3.68 | 3.78 | 3.91 | 0.145 | 0.149 | 0.154 |
| E4 (for AL product) | 0.58 typ. | | | 0.023 typ. | | |
| E4 (for other product) | 0.75 typ. | | | 0.030 typ. | | |
| e | 1.27 BSC | | | 0.050 BSC | | |
| K (for AL product) | 1.45 typ. | | | 0.057 typ. | | |
| K (for other product) | 1.27 typ. | | | 0.050 typ. | | |
| K1 | 0.56 | - | - | 0.022 | - | - |
| H | 0.51 | 0.61 | 0.71 | 0.020 | 0.024 | 0.028 |
| L | 0.51 | 0.61 | 0.71 | 0.020 | 0.024 | 0.028 |
| L1 | 0.06 | 0.13 | 0.20 | 0.002 | 0.005 | 0.008 |
| θ | 0° | - | 12° | 0° | - | 12° |
| W | 0.15 | 0.25 | 0.36 | 0.006 | 0.010 | 0.014 |
| M | 0.125 typ. | | | 0.005 typ. | | |
| ECN: C13-0702-Rev. K, 20-May-13 | | | | | | |
| DWG: 5881 | | | | | | |

RECOMMENDED MINIMUM PADS FOR PowerPAK® SO-8 Single



Recommended Minimum Pads
Dimensions in Inches/(mm)

[Return to Index](#)



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Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

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- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
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JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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Факс: 8 (812) 320-03-32

Электронная почта: ocean@oceanchips.ru

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