Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!


## Contact us

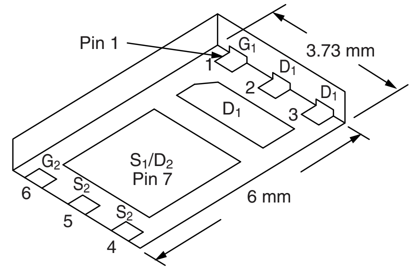
Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

# Dual N-Channel 30 V (D-S) MOSFETs with Schottky Diode

## PRODUCT SUMMARY

| | $V_{DS}$ (V) | $R_{DS(on)}$ (Ω) | $I_D$ (A) | $Q_g$ (Typ.) |
|---|---|---|---|---|
| Channel-1 | 30 | 0.0093 at $V_{GS}$ = 10 V | 16[a] | 7.7 nC |
| | | 0.0130 at $V_{GS}$ = 4.5 V | 16[a] | |
| Channel-2 | 30 | 0.0047 at $V_{GS}$ = 10 V | 35[a] | 17 nC |
| | | 0.0059 at $V_{GS}$ = 4.5 V | 35[a] | |

PowerPAIR® 6 x 3.7




**Ordering Information:** SiZ790DT-T1-GE3 (Lead (Pb)-free and Halogen-free)

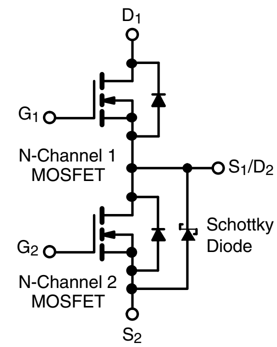
## FEATURES

- **Halogen-free According to IEC 61249-2-21 Definition**
- SkyFET® Monolithic TrenchFET® Power MOSFETs and Schottky Diode
- 100 % $R_g$ and UIS Tested
- Compliant to RoHS Directive 2002/95/EC

RoHS COMPLIANT
HALOGEN FREE

## APPLICATIONS

- System Power
  - Notebook
  - Server
- POL
- Synchronous Buck Converter




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

| Parameter | | Symbol | Channel-1 | Channel-2 | Unit |
|---|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 30 | | V |
| Gate-Source Voltage | | $V_{GS}$ | ± 20 | | |
| Continuous Drain Current ($T_J$ = 150 °C) | $T_C$ = 25 °C | $I_D$ | 16[a] | 35[a] | A |
| | $T_C$ = 70 °C | | 16[a] | 35[a] | |
| | $T_A$ = 25 °C | | 12.9[b, c] | 23.4[b, c] | |
| | $T_A$ = 70 °C | | 10.3[b, c] | 18.7[b, c] | |
| Pulsed Drain Current (t = 300 µs) | | $I_{DM}$ | 70 | 100 | |
| Continuous Source Drain Diode Current | $T_C$ = 25 °C | $I_S$ | 16[a] | 35[a] | |
| | $T_A$ = 25 °C | | 3.2[b, c] | 3.8[b, c] | |
| Single Pulse Avalanche Current | L = 0.1 mH | $I_{AS}$ | 16 | 30 | |
| Single Pulse Avalanche Energy | | $E_{AS}$ | 13 | 45 | mJ |
| Maximum Power Dissipation | $T_C$ = 25 °C | $P_D$ | 27 | 48 | W |
| | $T_C$ = 70 °C | | 17 | 31 | |
| | $T_A$ = 25 °C | | 3.9[b, c] | 4.6[b, c] | |
| | $T_A$ = 70 °C | | 2.5[b, c] | 3[b, c] | |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{stg}$ | - 55 to 150 | | °C |
| Soldering Recommendations (Peak Temperature)[d, e] | | | 260 | | |

## THERMAL RESISTANCE RATINGS

| Parameter | | Symbol | Channel-1 | | Channel-2 | | Unit |
|---|---|---|---|---|---|---|---|
| | | | Typ. | Max. | Typ. | Max. | |
| Maximum Junction-to-Ambient[b, f] | t ≤ 10 s | $R_{thJA}$ | 24 | 32 | 20 | 27 | °C/W |
| Maximum Junction-to-Case (Drain) | Steady State | $R_{thJC}$ | 3.5 | 4.6 | 2 | 2.6 | |

Notes:
a. Package limited.
b. Surface mounted on 1" x 1" FR4 board.
c. t = 10 s.
d. See solder profile (www.vishay.com/doc?73257). The PowerPAIR 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.
e. Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.
f. Maximum under steady state conditions is 67 °C/W for channel-1 and 65 °C/W for channel-2.



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| SPECIFICATIONS ($T_J$ = 25 °C, unless otherwise noted) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Parameter | Symbol | Test Conditions | | Min. | Typ. | Max. | Unit |
| **Static** | | | | | | | |
| Drain-Source Breakdown Voltage | $V_{DS}$ | $V_{GS}$ = 0 V, $I_D$ = 250 µA | Ch-1 | 30 | | | V |
| | | $V_{GS}$ = 0 V, $I_D$ = 250 µA | Ch-2 | 30 | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D$ = 250 µA | Ch-1 | 1 | | 2.2 | |
| | | $V_{DS} = V_{GS}$, $I_D$ = 250 µA | Ch-2 | 1.1 | | 2.2 | |
| Gate Source Leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ± 20 V | Ch-1 | | | ± 100 | nA |
| | | | Ch-2 | | | ± 100 | |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 30 V, $V_{GS}$ = 0 V | Ch-1 | | | 1 | µA |
| | | $V_{DS}$ = 30 V, $V_{GS}$ = 0 V | Ch-2 | | 50 | 200 | |
| | | $V_{DS}$ = 30 V, $V_{GS}$ = 0 V, $T_J$ = 55 °C | Ch-1 | | | 5 | |
| | | $V_{DS}$ = 30 V, $V_{GS}$ = 0 V, $T_J$ = 55 °C | Ch-2 | | 140 | 1400 | |
| On-State Drain Current[b] | $I_{D(on)}$ | $V_{DS} \geq$ 5 V, $V_{GS}$ = 10 V | Ch-1 | 15 | | | A |
| | | $V_{DS} \geq$ 5 V, $V_{GS}$ = 10 V | Ch-2 | 20 | | | |
| Drain-Source On-State Resistance[b] | $R_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D$ = 15 A | Ch-1 | | 0.0075 | 0.0093 | Ω |
| | | $V_{GS}$ = 10 V, $I_D$ = 20 A | Ch-2 | | 0.0038 | 0.0047 | |
| | | $V_{GS}$ = 4.5 V, $I_D$ = 13 A | Ch-1 | | 0.0105 | 0.0130 | |
| | | $V_{GS}$ = 4.5 V, $I_D$ = 20 A | Ch-2 | | 0.0048 | 0.0059 | |
| Forward Transconductance[b] | $g_{fs}$ | $V_{DS}$ = 15 V, $I_D$ = 15 A | Ch-1 | | 48 | | S |
| | | $V_{DS}$ = 15 V, $I_D$ = 20 A | Ch-2 | | 85 | | |
| **Dynamic[a]** | | | | | | | |
| Input Capacitance | $C_{iss}$ | Channel-1<br>$V_{DS}$ = 15 V, $V_{GS}$ = 0 V, f = 1 MHz<br><br>Channel-2<br>$V_{DS}$ = 10 V, $V_{GS}$ = 0 V, f = 1 MHz | Ch-1 | | 830 | | pF |
| | | | Ch-2 | | 1980 | | |
| Output Capacitance | $C_{oss}$ | | Ch-1 | | 185 | | |
| | | | Ch-2 | | 455 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | Ch-1 | | 80 | | |
| | | | Ch-2 | | 165 | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = 15 V, $V_{GS}$ = 10 V, $I_D$ = 15 A | Ch-1 | | 15.6 | 24 | nC |
| | | $V_{DS}$ = 15 V, $V_{GS}$ = 10 V, $I_D$ = 20 A | Ch-2 | | 36 | 54 | |
| | | Channel-1<br>$V_{DS}$ = 15 V, $V_{GS}$ = 4.5 V, $I_D$ = 15 A<br><br>Channel-2<br>$V_{DS}$ = 15 V, $V_{GS}$ = 4.5 V, $I_D$ = 20 A | Ch-1 | | 7.7 | 12 | |
| | | | Ch-2 | | 17 | 26 | |
| Gate-Source Charge | $Q_{gs}$ | | Ch-1 | | 2.6 | | |
| | | | Ch-2 | | 5.7 | | |
| Gate-Drain Charge | $Q_{gd}$ | | Ch-1 | | 3 | | |
| | | | Ch-2 | | 5 | | |
| Gate Resistance | $R_g$ | f = 1 MHz | Ch-1 | 0.2 | 1 | 2 | Ω |
| | | | Ch-2 | 0.2 | 0.9 | 1.8 | |

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



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| **SPECIFICATIONS** ($T_J$ = 25 °C, unless otherwise noted) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Test Conditions** | | **Min.** | **Typ.** | **Max.** | **Unit** |
| **Dynamic**[a] | | | | | | | |
| Turn-On Delay Time | $t_{d(on)}$ | Channel-1<br>$V_{DD}$ = 15 V, $R_L$ = 1.5 Ω<br>$I_D \cong$ 10 A, $V_{GEN}$ = 4.5 V, $R_g$ = 1 Ω<br><br>Channel-2<br>$V_{DD}$ = 15 V, $R_L$ = 1.5 Ω<br>$I_D \cong$ 10 A, $V_{GEN}$ = 4.5 V, $R_g$ = 1 Ω | Ch-1 | | 10 | 20 | ns |
| | | | Ch-2 | | 20 | 40 | |
| Rise Time | $t_r$ | | Ch-1 | | 15 | 30 | |
| | | | Ch-2 | | 15 | 30 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | Ch-1 | | 15 | 30 | |
| | | | Ch-2 | | 25 | 50 | |
| Fall Time | $t_f$ | | Ch-1 | | 7 | 15 | |
| | | | Ch-2 | | 10 | 20 | |
| Turn-On Delay Time | $t_{d(on)}$ | Channel-1<br>$V_{DD}$ = 15 V, $R_L$ = 1.5 Ω<br>$I_D \cong$ 10 A, $V_{GEN}$ = 10 V, $R_g$ = 1 Ω<br><br>Channel-2<br>$V_{DD}$ = 15 V, $R_L$ = 1.5 Ω<br>$I_D \cong$ 10 A, $V_{GEN}$ = 10 V, $R_g$ = 1 Ω | Ch-1 | | 5 | 10 | |
| | | | Ch-2 | | 10 | 20 | |
| Rise Time | $t_r$ | | Ch-1 | | 15 | 30 | |
| | | | Ch-2 | | 10 | 20 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | Ch-1 | | 17 | 35 | |
| | | | Ch-2 | | 25 | 50 | |
| Fall Time | $t_f$ | | Ch-1 | | 7 | 15 | |
| | | | Ch-2 | | 10 | 20 | |
| **Drain-Source Body Diode Characteristics** | | | | | | | |
| Continuous Source-Drain Diode Current | $I_S$ | $T_C$ = 25 °C | Ch-1 | | | 16 | A |
| | | | Ch-2 | | | 35 | |
| Pulse Diode Forward Current[a] | $I_{SM}$ | | Ch-1 | | | 70 | |
| | | | Ch-2 | | | 100 | |
| Body Diode Voltage | $V_{SD}$ | $I_S$ = 10 A, $V_{GS}$ = 0 V | Ch-1 | | 0.8 | 1.2 | V |
| | | $I_S$ = 2 A, $V_{GS}$ = 0 V | Ch-2 | | 0.38 | 0.48 | |
| Body Diode Reverse Recovery Time | $t_{rr}$ | Channel-1<br>$I_F$ = 10 A, dI/dt = 100 A/µs, $T_J$ = 25 °C<br><br>Channel-2<br>$I_F$ = 10 A, dI/dt = 100 A/µs, $T_J$ = 25 °C | Ch-1 | | 15 | 30 | ns |
| | | | Ch-2 | | 20 | 40 | |
| Body Diode Reverse Recovery Charge | $Q_{rr}$ | | Ch-1 | | 6 | 12 | nC |
| | | | Ch-2 | | 15 | 32 | |
| Reverse Recovery Fall Time | $t_a$ | | Ch-1 | | 9 | | ns |
| | | | Ch-2 | | 10.5 | | |
| Reverse Recovery Rise Time | $t_b$ | | Ch-1 | | 6 | | |
| | | | Ch-2 | | 9.5 | | |

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

*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.*


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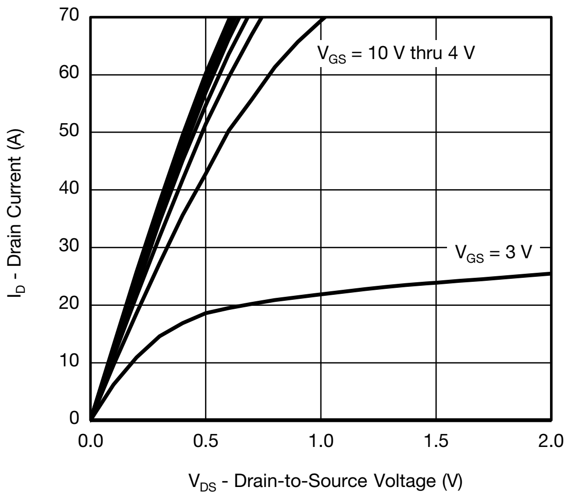
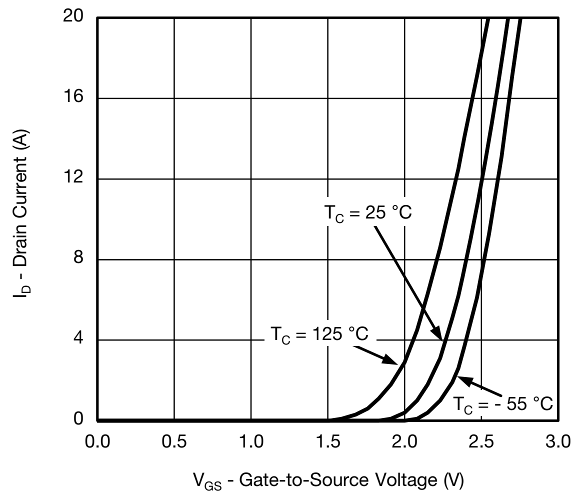
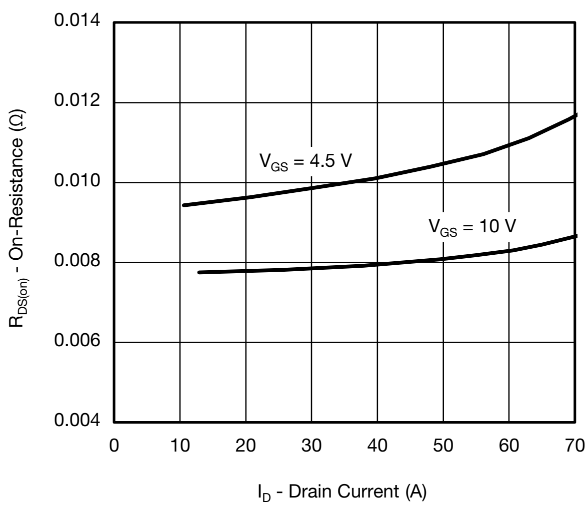
**CHANNEL-1 TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



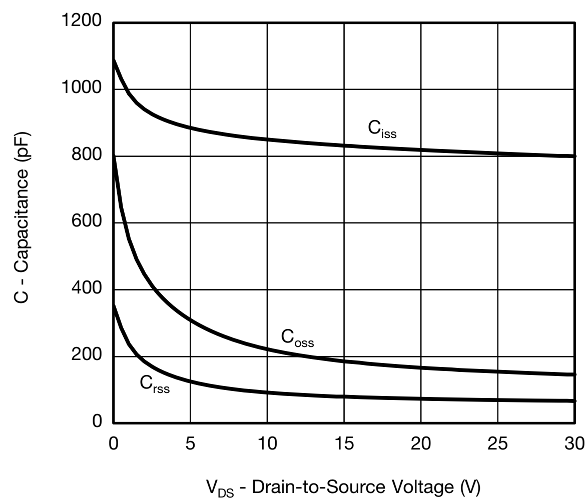

**Output Characteristics**



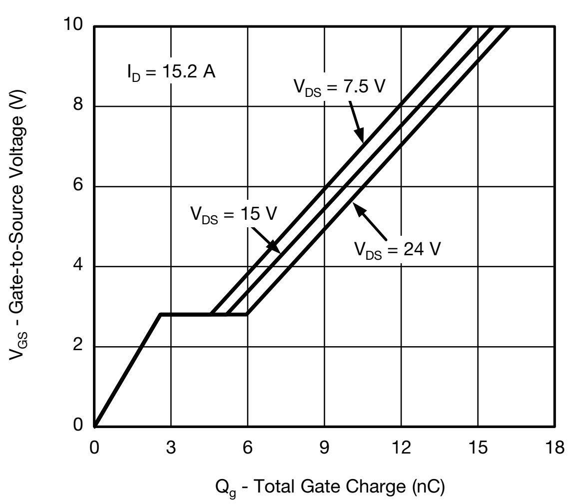

**Transfer Characteristics**



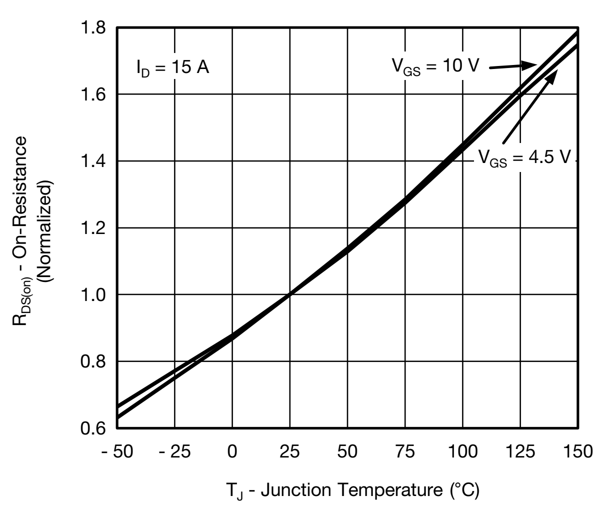

**On-Resistance vs. Drain Current**




**Capacitance**




**Gate Charge**




**On-Resistance vs. Junction Temperature**



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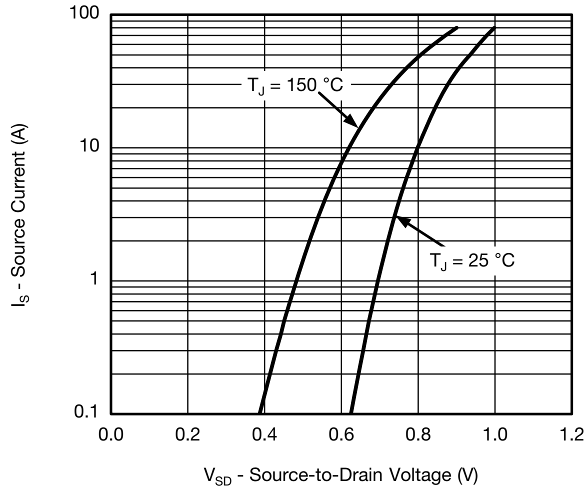
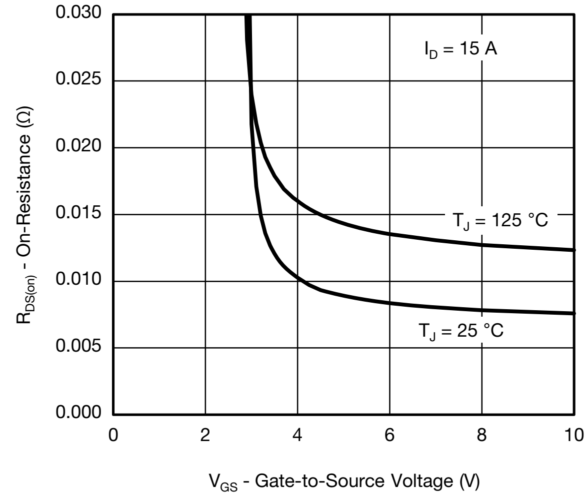
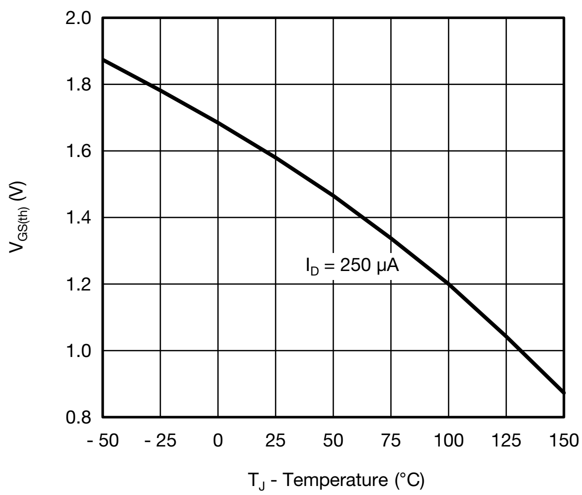
**CHANNEL-1 TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



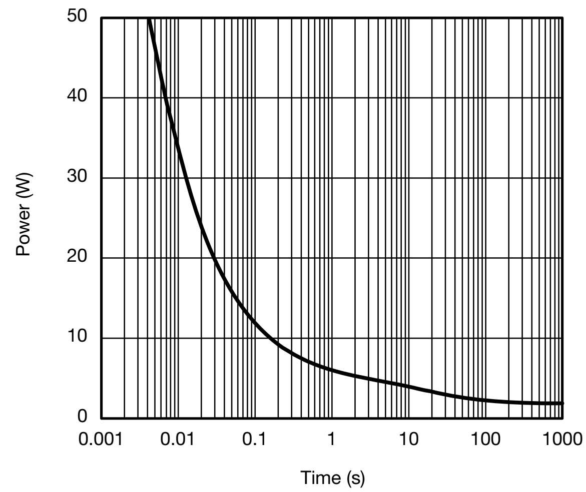

**Source-Drain Diode Forward Voltage**



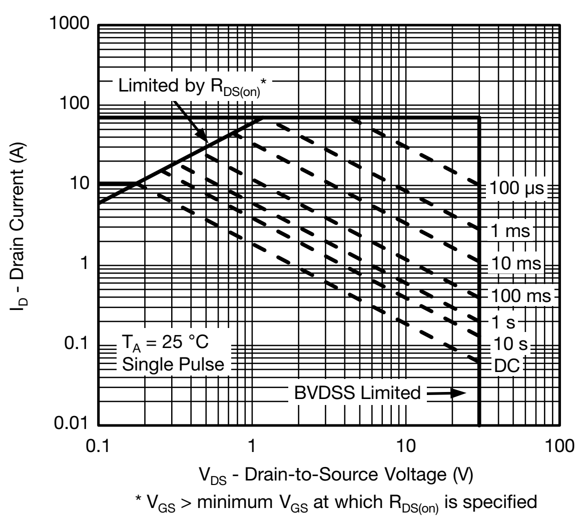

**On-Resistance vs. Gate-to-Source Voltage**




**Threshold Voltage**




**Single Pulse Power**




**Safe Operating Area, Junction-to-Ambient**



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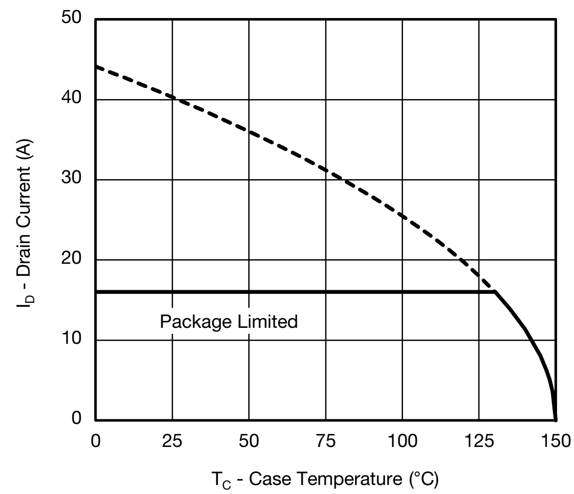
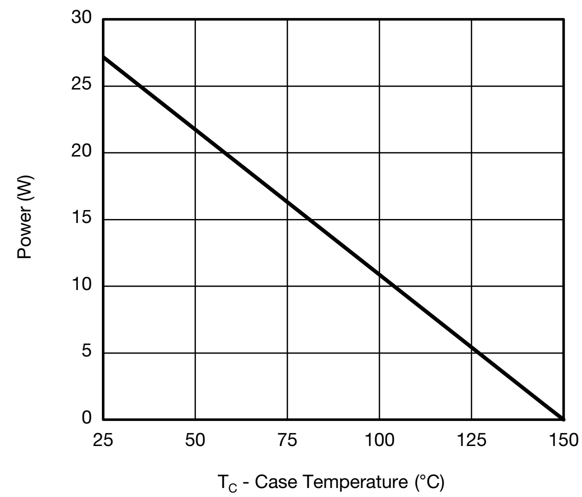
**CHANNEL-1 TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)




**Current Derating***




**Power, Junction-to-Case**

* 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.



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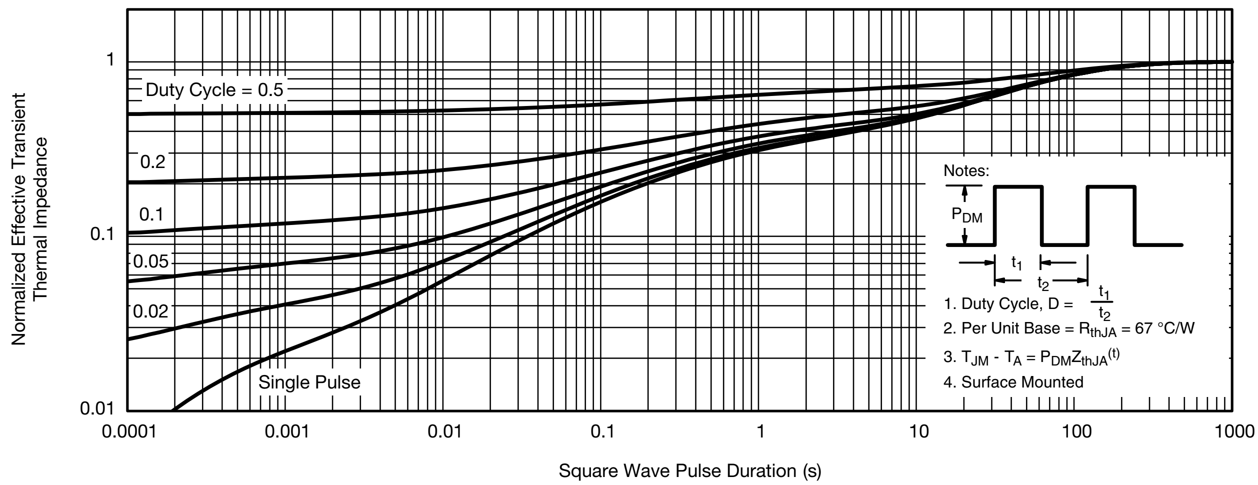
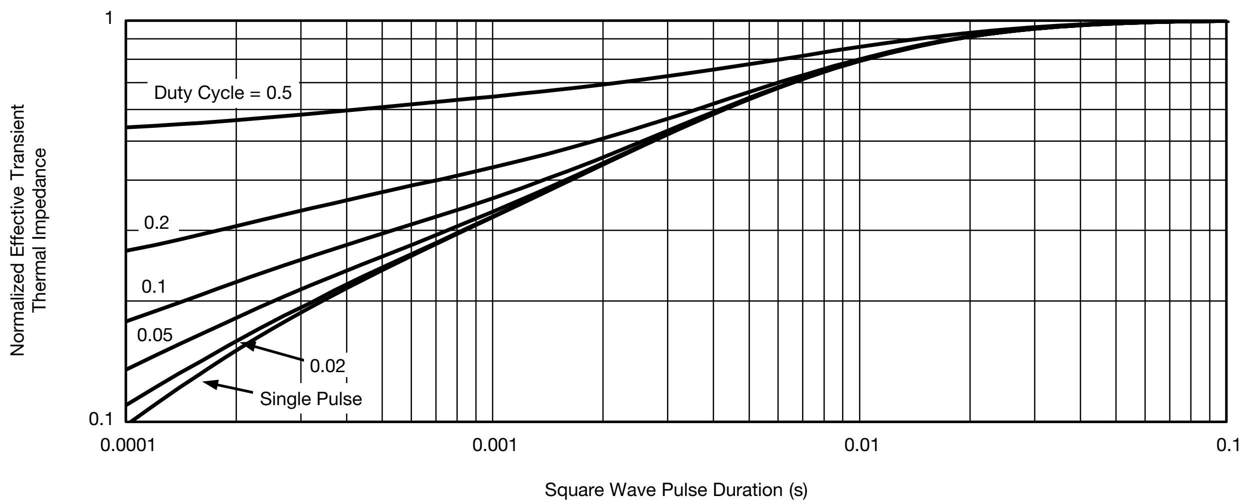
**CHANNEL-1 TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)




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




**Normalized Thermal Transient Impedance, Junction-to-Case**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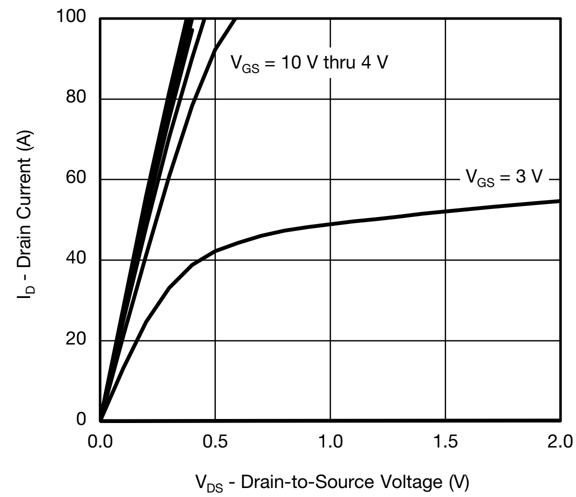
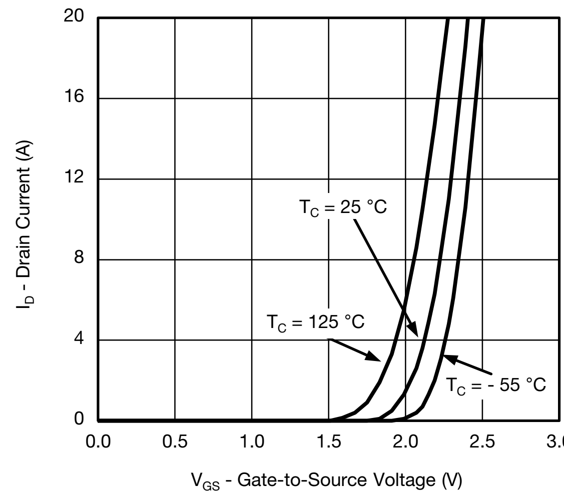
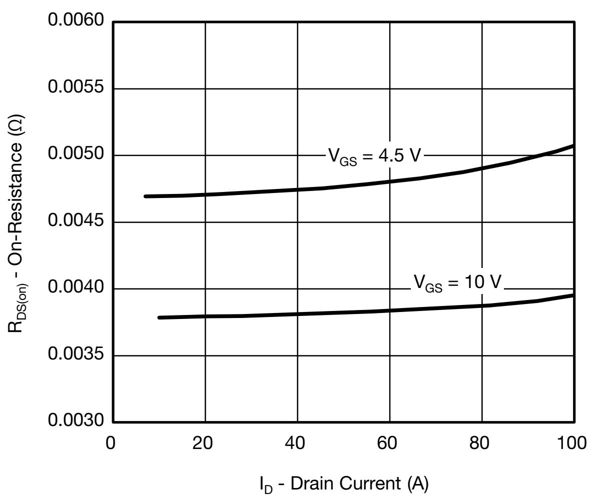
**CHANNEL-2 TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



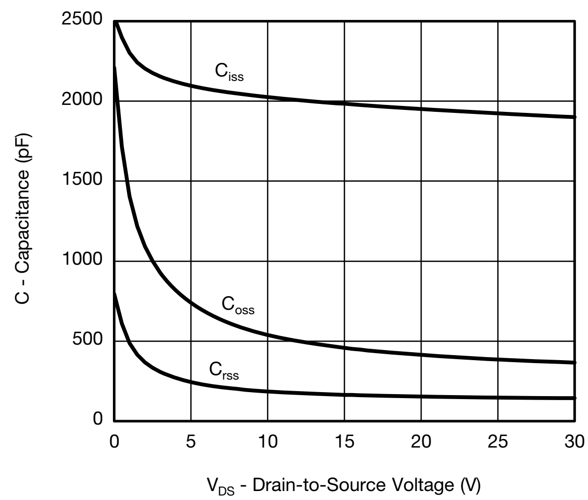

**Output Characteristics**



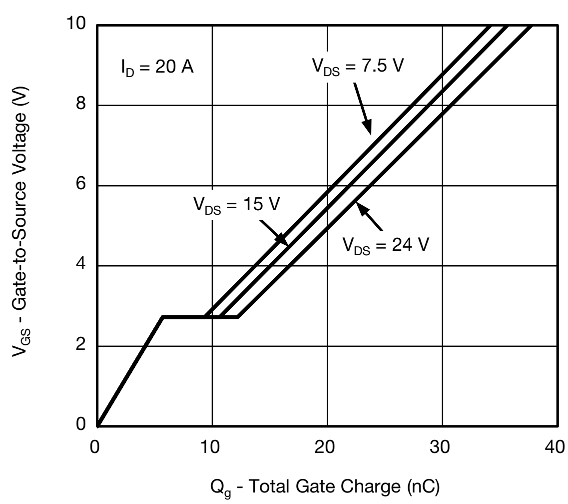

**Transfer Characteristics**



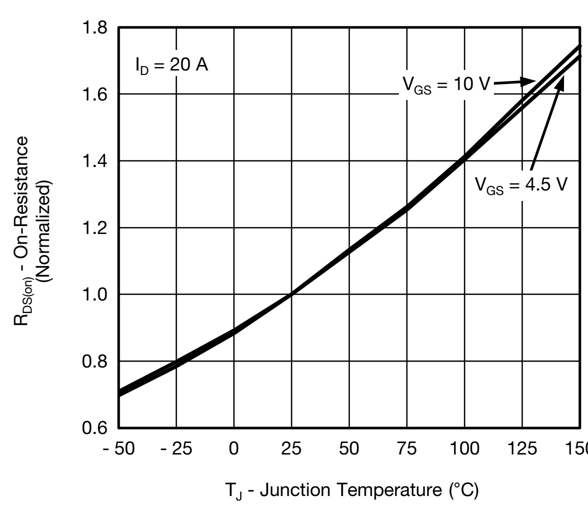

**On-Resistance vs. Drain Current**




**Capacitance**




**Gate Charge**




**On-Resistance vs. Junction Temperature**



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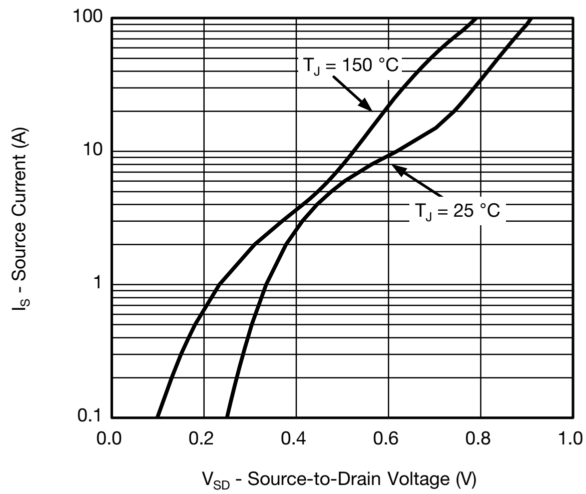
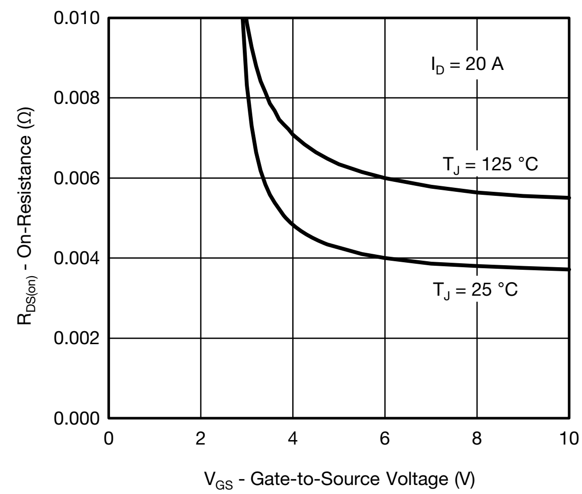
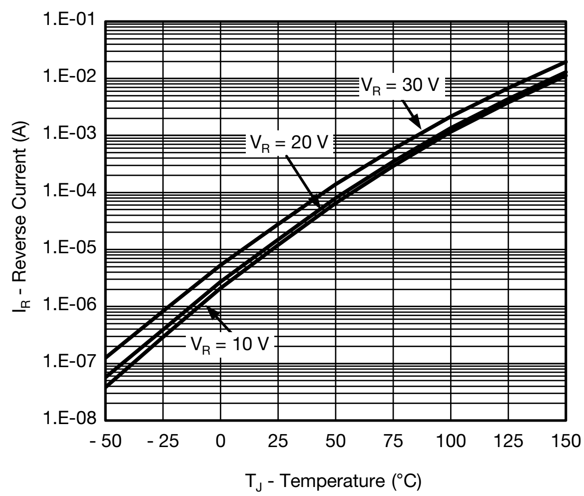
## CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



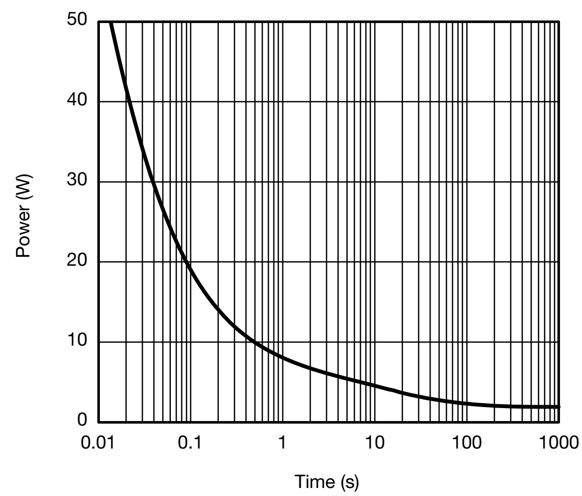

**Source-Drain Diode Forward Voltage**



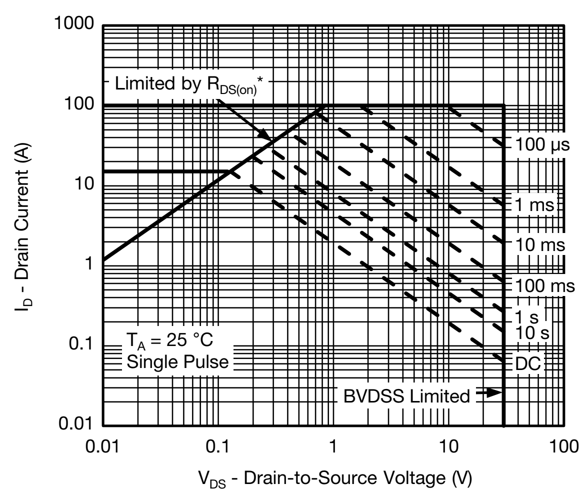

**On-Resistance vs. Gate-to-Source**




**Reverse Current vs. Junction Temperature**




**Single Pulse Power**




* $V_{GS}$ > minimum $V_{GS}$ at which $R_{DS(on)}$ is specified

**Safe Operating Area, Junction-to-Ambient**



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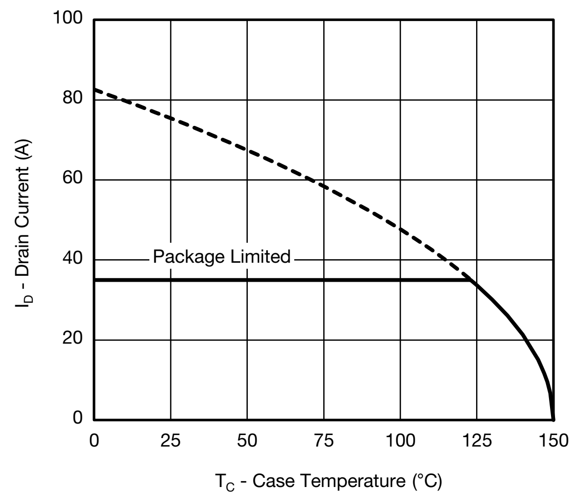
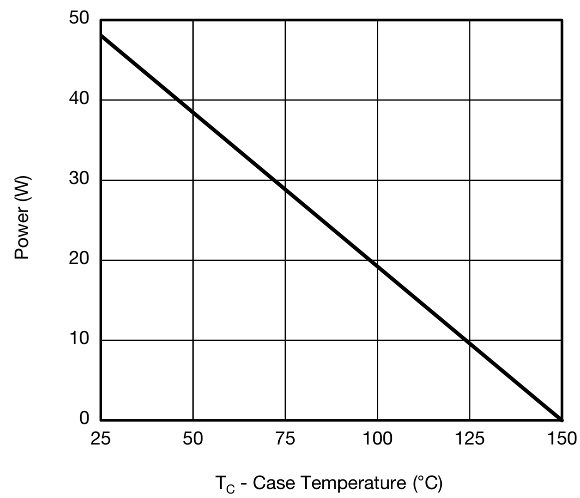
## CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)




**Current Derating***




**Power, Junction-to-Case**

* 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.



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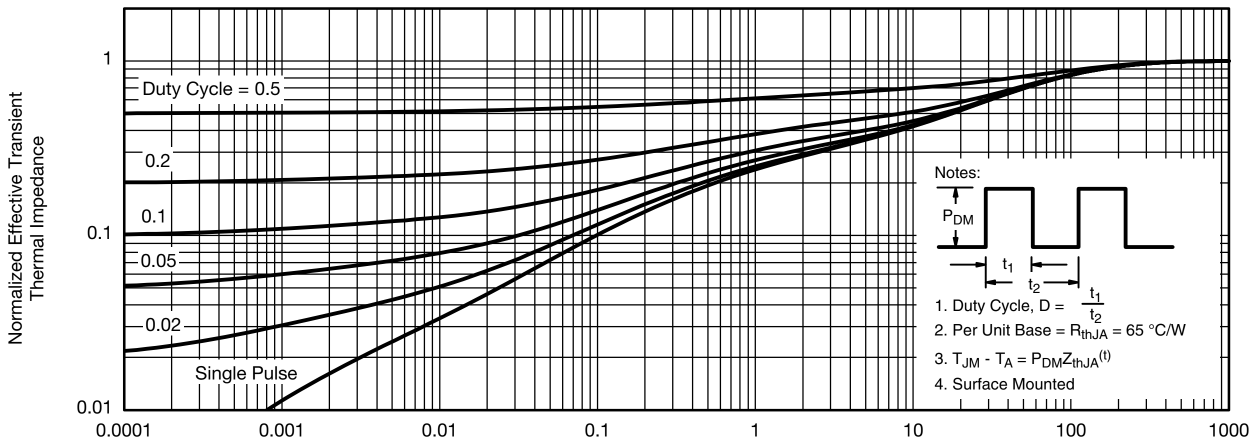
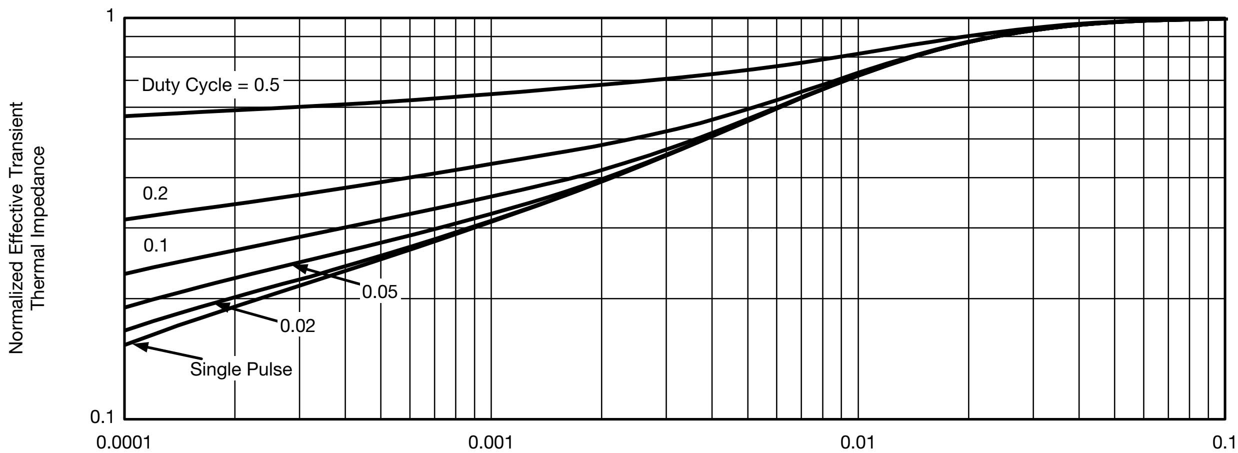
**CHANNEL-2 TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)




Square Wave Pulse Duration (s)

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




Square Wave Pulse Duration (s)

**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?67669.*



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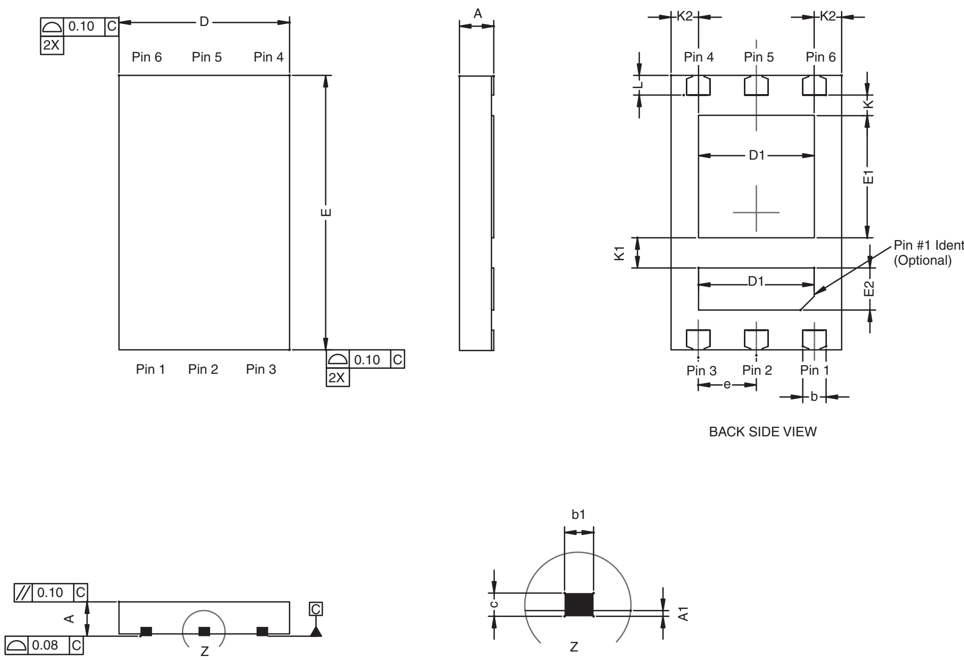
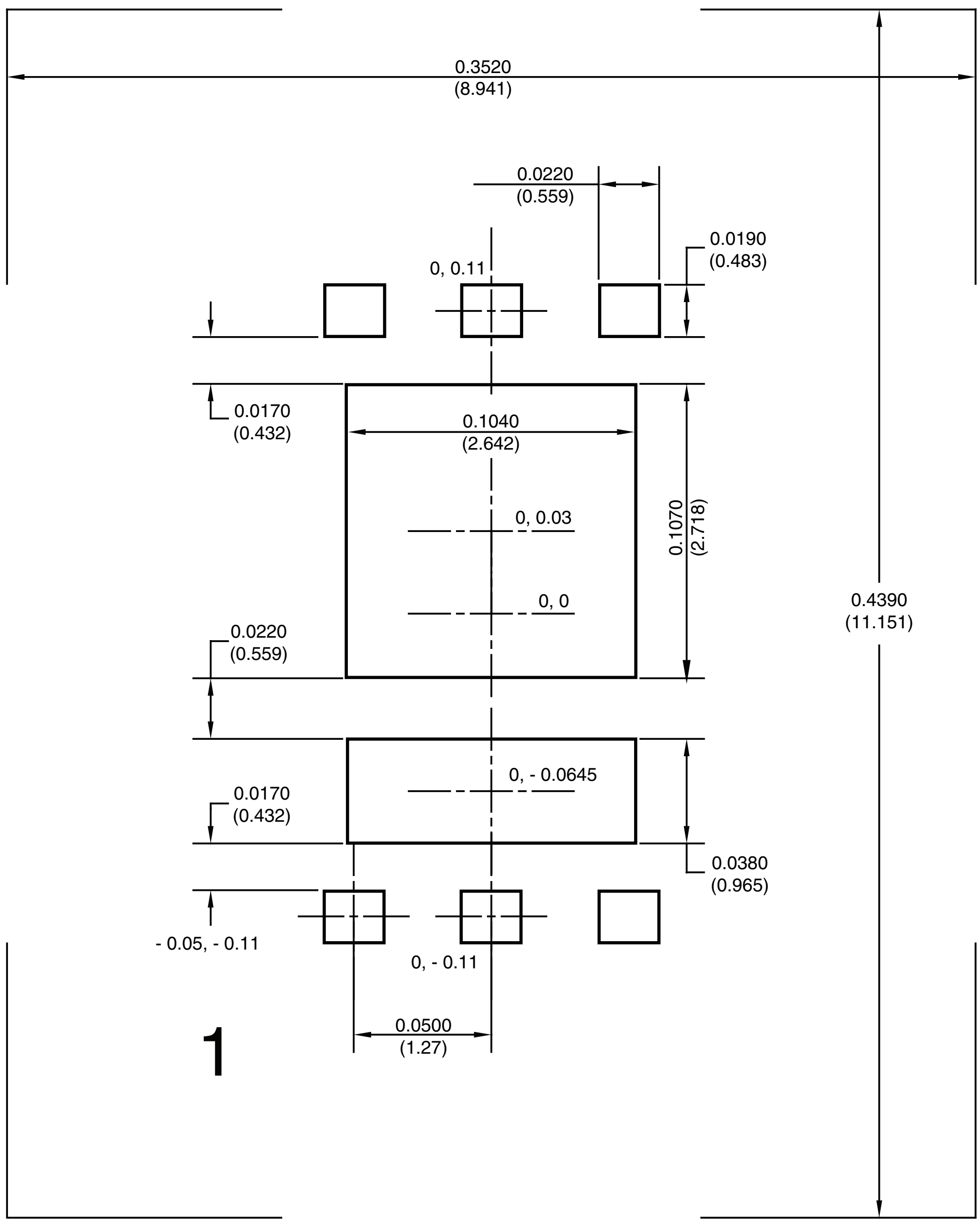
## PowerPAIR™ 6 x 3.7 CASE OUTLINE




| DIM. | MILLIMETERS | | | INCHES | | |
|---|---|---|---|---|---|---|
| | MIN. | NOM. | MAX. | MIN. | NOM. | MAX. |
| A | 0.70 | 0.75 | 0.80 | 0.028 | 0.030 | 0.032 |
| A1 | 0.00 | - | 0.05 | 0.000 | - | 0.002 |
| b | 0.46 | 0.51 | 0.56 | 0.018 | 0.020 | 0.022 |
| b1 | 0.20 | 0.25 | 0.38 | 0.008 | 0.010 | 0.015 |
| C | 0.18 | 0.20 | 0.23 | 0.007 | 0.008 | 0.009 |
| D | 3.65 | 3.73 | 3.81 | 0.144 | 0.147 | 0.150 |
| D1 | 2.41 | 2.53 | 2.65 | 0.095 | 0.100 | 0.104 |
| E | 5.92 | 6.00 | 6.08 | 0.233 | 0.236 | 0.239 |
| E1 | 2.62 | 2.67 | 2.72 | 0.103 | 0.105 | 0.107 |
| E2 | 0.87 | 0.92 | 0.97 | 0.034 | 0.036 | 0.038 |
| e | 1.27 BSC | | | 0.05 BSC | | |
| K | 0.45 TYP. | | | 0.018 TYP. | | |
| K1 | 0.66 TYP. | | | 0.026 TYP. | | |
| K2 | 0.60 TYP. | | | 0.024 TYP. | | |
| L | 0.38 | 0.43 | 0.48 | 0.015 | 0.017 | 0.019 |
| ECN: S-82772-Rev. B, 17-Nov-08<br>DWG: 5979 | | | | | | |

**RECOMMENDED PAD FOR PowerPAIR™ 6 x 3.7**




Recommended PAD for PowerPAIR 6 x 3.7
Dimensions in inches (mm)
Keep-out 0.3520 (8.94) x 0.4390 (11.151)

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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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