

## HT8KE5TB1-VB Datasheet

### Dual N-Channel 100 V (D-S) MOSFET

#### PRODUCT SUMMARY

| $V_{DS}$ (V) | $R_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A) <sup>f</sup> | $Q_g$ (Typ.) |
|--------------|---------------------------|------------------------|--------------|
| 100          | 0.071 at $V_{GS} = 10$ V  | 12.1                   | 3.3 nC       |
|              | 0.076 at $V_{GS} = 7.5$ V | 11.8                   |              |
|              | 0.086 at $V_{GS} = 6$ V   | 10.9                   |              |

#### FEATURES

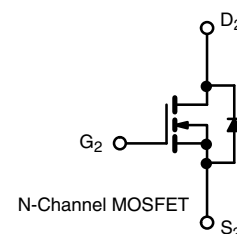
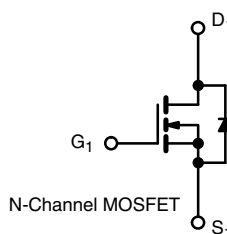
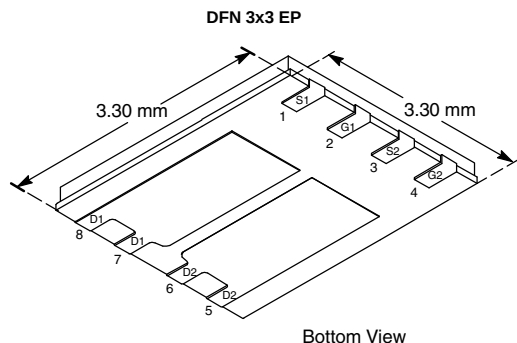
- Trench Power MOSFET
- 100 %  $R_g$  and UIS Tested

#### APPLICATIONS

- DC/DC Conversion
- Primary side switch
- Synchronous Rectification
- Industrial
- 48 V Battery Monitoring
- LED Driver



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



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

| Parameter                                                    | Symbol         | Limit         | Unit |
|--------------------------------------------------------------|----------------|---------------|------|
| Drain-Source Voltage                                         | $V_{DS}$       | 100           | V    |
| Gate-Source Voltage                                          | $V_{GS}$       | $\pm 20$      |      |
| Continuous Drain Current ( $T_J = 150$ °C)                   | $I_D$          | $T_C = 25$ °C | A    |
|                                                              |                | $T_C = 70$ °C |      |
|                                                              |                | $T_A = 25$ °C |      |
|                                                              |                | $T_A = 70$ °C |      |
| Pulsed Drain Current ( $t = 300$ $\mu$ s)                    | $I_{DM}$       | 20            | A    |
| Continuous Source-Drain Diode Current                        | $I_S$          | $T_C = 25$ °C |      |
|                                                              |                | $T_A = 25$ °C |      |
| Single Pulse Avalanche Current                               | $I_{AS}$       | 7             | mJ   |
| Single Pulse Avalanche Energy                                | $E_{AS}$       | 2.5           |      |
| Maximum Power Dissipation                                    | $P_D$          | $T_C = 25$ °C | W    |
|                                                              |                | $T_C = 70$ °C |      |
|                                                              |                | $T_A = 25$ °C |      |
|                                                              |                | $T_A = 70$ °C |      |
| Operating Junction and Storage Temperature Range             | $T_J, T_{stg}$ | - 55 to 150   | °C   |
| Soldering Recommendations (Peak Temperature) <sup>c, d</sup> |                | 260           |      |

#### THERMAL RESISTANCE RATINGS

| Parameter                                   | Symbol     | Typical | Maximum | Unit |
|---------------------------------------------|------------|---------|---------|------|
| Maximum Junction-to-Ambient <sup>a, e</sup> | $R_{thJA}$ | 35      | 44      | °C/W |
| Maximum Junction-to-Case (Drain)            | $R_{thJC}$ | 4       | 5       |      |

Notes:

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

b.  $t = 10$  s.

c. The DFN3x3 package 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.

d. Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.

e. Maximum under steady state conditions is 94 °C/W.

f. Based on  $T_C = 25$  °C.

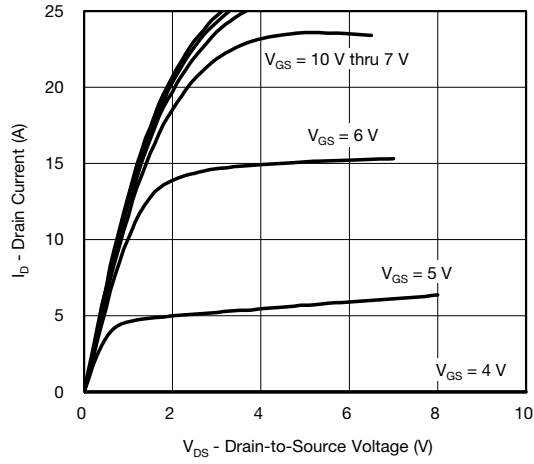
| SPECIFICATIONS (T <sub>J</sub> = 25 °C, unless otherwise noted) |                                      |                                                                                                                       |      |       |       |       |
|-----------------------------------------------------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------|------|-------|-------|-------|
| Parameter                                                       | Symbol                               | Test Conditions                                                                                                       | Min. | Typ.  | Max.  | Unit  |
| Static                                                          |                                      |                                                                                                                       |      |       |       |       |
| Drain-Source Breakdown Voltage                                  | V <sub>DS</sub>                      | V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA                                                                        | 100  |       |       | V     |
| V <sub>DS</sub> Temperature Coefficient                         | ΔV <sub>DS</sub> /T <sub>J</sub>     | I <sub>D</sub> = 250 μA                                                                                               |      | 61    |       | mV/°C |
| V <sub>GS(th)</sub> Temperature Coefficient                     | ΔV <sub>GS(th)</sub> /T <sub>J</sub> |                                                                                                                       |      | - 6.2 |       |       |
| Gate-Source Threshold Voltage                                   | V <sub>GS(th)</sub>                  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA                                                           | 2.5  |       | 4     | V     |
| Gate-Source Leakage                                             | I <sub>GSS</sub>                     | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V                                                                       |      |       | ± 100 | nA    |
| Zero Gate Voltage Drain Current                                 | I <sub>DSS</sub>                     | V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V                                                                        |      |       | 1     | μA    |
|                                                                 |                                      | V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C                                                |      |       | 10    |       |
| On-State Drain Current <sup>a</sup>                             | I <sub>D(on)</sub>                   | V <sub>DS</sub> ≥ 5 V, V <sub>GS</sub> = 10 V                                                                         | 8    |       |       | A     |
| Drain-Source On-State Resistance <sup>a</sup>                   | R <sub>DS(on)</sub>                  | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 8 A                                                                          |      | 0.071 |       | Ω     |
|                                                                 |                                      | V <sub>GS</sub> = 7.5 V, I <sub>D</sub> = 6 A                                                                         |      | 0.076 |       |       |
|                                                                 |                                      | V <sub>GS</sub> = 6 V, I <sub>D</sub> = 4 A                                                                           |      | 0.086 |       |       |
| Forward Transconductance <sup>a</sup>                           | g <sub>fs</sub>                      | V <sub>DS</sub> = 15 V, I <sub>D</sub> = 8 A                                                                          |      | 11    |       | S     |
| Dynamic <sup>b</sup>                                            |                                      |                                                                                                                       |      |       |       |       |
| Input Capacitance                                               | C <sub>iss</sub>                     | V <sub>DS</sub> = 50 V, V <sub>GS</sub> = 0 V, f = 1 MHz                                                              |      | 250   |       | pF    |
| Output Capacitance                                              | C <sub>oss</sub>                     |                                                                                                                       |      | 73    |       |       |
| Reverse Transfer Capacitance                                    | C <sub>rss</sub>                     |                                                                                                                       |      | 7     |       |       |
| Total Gate Charge                                               | Q <sub>g</sub>                       | V <sub>DS</sub> = 50 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 10 A                                                 |      | 5.2   | 8     | nC    |
|                                                                 |                                      | V <sub>DS</sub> = 50 V, V <sub>GS</sub> = 7.5 V, I <sub>D</sub> = 10 A                                                |      | 4     | 6     |       |
|                                                                 |                                      | V <sub>DS</sub> = 50 V, V <sub>GS</sub> = 6 V, I <sub>D</sub> = 10 A                                                  |      | 3.3   | 5     |       |
| Gate-Source Charge                                              | Q <sub>gs</sub>                      |                                                                                                                       |      | 1.4   |       |       |
| Gate-Drain Charge                                               | Q <sub>gd</sub>                      |                                                                                                                       |      | 1.5   |       |       |
| Output Charge                                                   | Q <sub>oss</sub>                     | V <sub>DS</sub> = 50 V, V <sub>GS</sub> = 0 V                                                                         |      | 7     | 11    |       |
| Gate Resistance                                                 | R <sub>g</sub>                       | f = 1 MHz                                                                                                             | 1    | 3.1   | 5     | Ω     |
| Turn-On Delay Time                                              | t <sub>d(on)</sub>                   | V <sub>DD</sub> = 50 V, R <sub>L</sub> = 5 Ω<br>I <sub>D</sub> ≅ 10 A, V <sub>GEN</sub> = 7.5 V, R <sub>g</sub> = 1 Ω |      | 8     | 16    | ns    |
| Rise Time                                                       | t <sub>r</sub>                       |                                                                                                                       |      | 8     | 16    |       |
| Turn-Off Delay Time                                             | t <sub>d(off)</sub>                  |                                                                                                                       |      | 8     | 16    |       |
| Fall Time                                                       | t <sub>f</sub>                       |                                                                                                                       |      | 6     | 12    |       |
| Turn-On Delay Time                                              | t <sub>d(on)</sub>                   | V <sub>DD</sub> = 50 V, R <sub>L</sub> = 5 Ω<br>I <sub>D</sub> ≅ 10 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 1 Ω  |      | 7     | 14    |       |
| Rise Time                                                       | t <sub>r</sub>                       |                                                                                                                       |      | 7     | 14    |       |
| Turn-Off Delay Time                                             | t <sub>d(off)</sub>                  |                                                                                                                       |      | 8     | 16    |       |
| Fall Time                                                       | t <sub>f</sub>                       |                                                                                                                       |      | 5     | 10    |       |
| Drain-Source Body Diode Characteristics                         |                                      |                                                                                                                       |      |       |       |       |
| Continuous Source-Drain Diode Current                           | I <sub>S</sub>                       | T <sub>C</sub> = 25 °C                                                                                                |      |       | 20    | A     |
| Pulse Diode Forward Current                                     | I <sub>SM</sub>                      |                                                                                                                       |      |       | 20    |       |
| Body Diode Voltage                                              | V <sub>SD</sub>                      | I <sub>S</sub> = 4 A, V <sub>GS</sub> = 0 V                                                                           |      | 0.87  | 1.2   | V     |
| Body Diode Reverse Recovery Time                                | t <sub>rr</sub>                      | I <sub>F</sub> = 5 A, di/dt = 100 A/μs, T <sub>J</sub> = 25 °C                                                        |      | 30    | 60    | ns    |
| Body Diode Reverse Recovery Charge                              | Q <sub>rr</sub>                      |                                                                                                                       |      | 27    | 54    | nC    |
| Reverse Recovery Fall Time                                      | t <sub>a</sub>                       |                                                                                                                       |      | 16    |       | ns    |
| Reverse Recovery Rise Time                                      | t <sub>b</sub>                       |                                                                                                                       |      | 14    |       |       |

Notes:

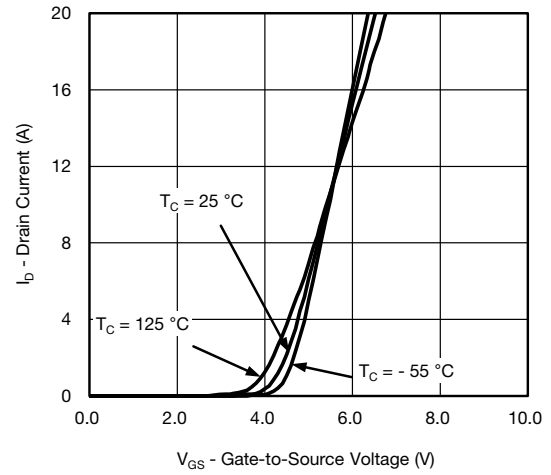
a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

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

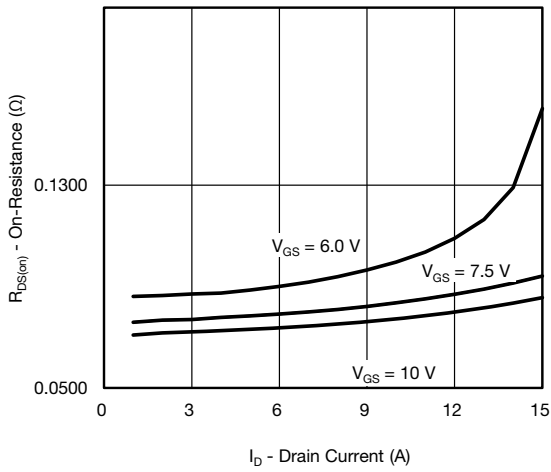
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



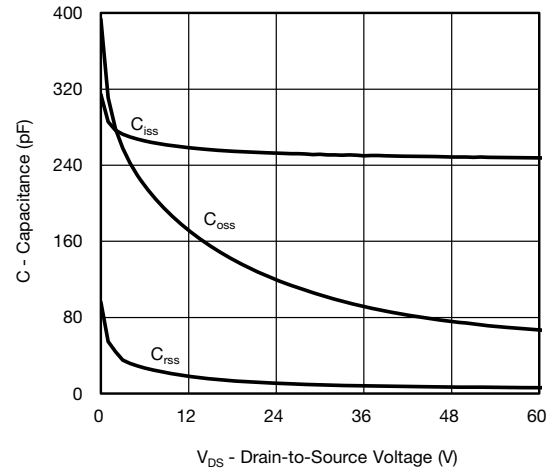
**Output Characteristics**



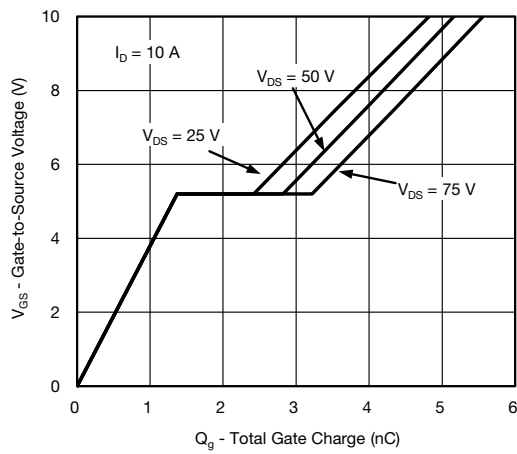
**Transfer Characteristics**



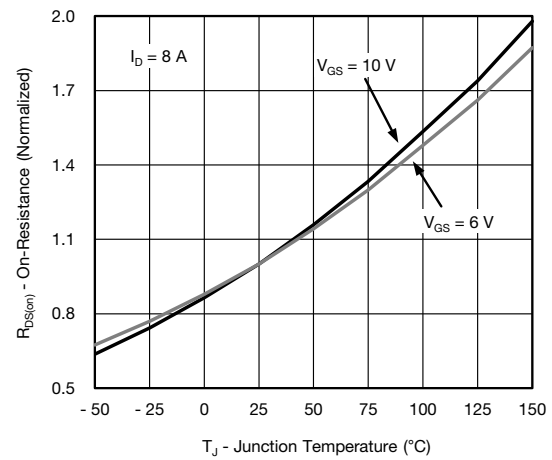
**On-Resistance vs. Drain Current and Gate Voltage**



**Capacitance**

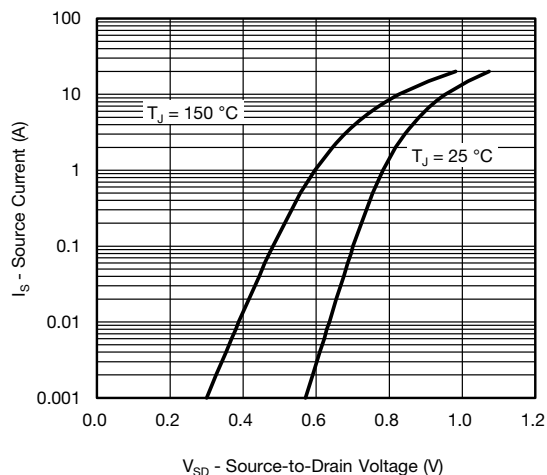


**Gate Charge**

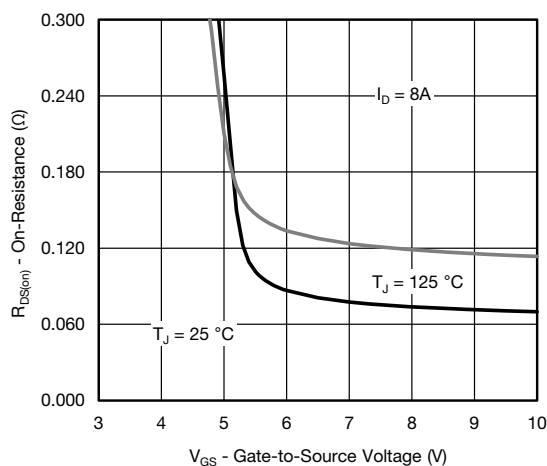


**On-Resistance vs. Junction Temperature**

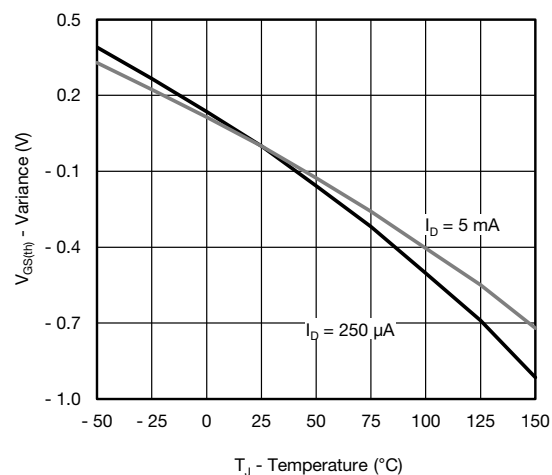
## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



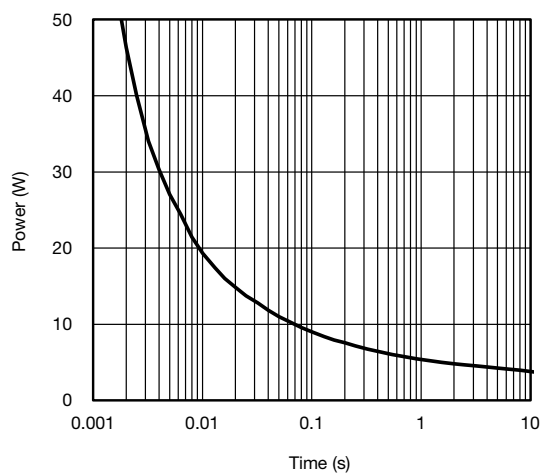
Source-Drain Diode Forward Voltage



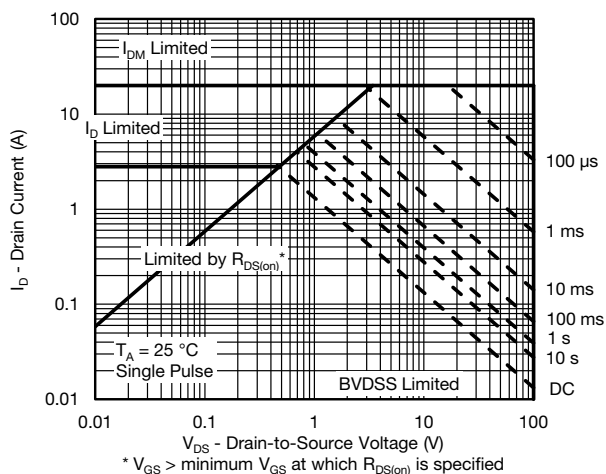
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

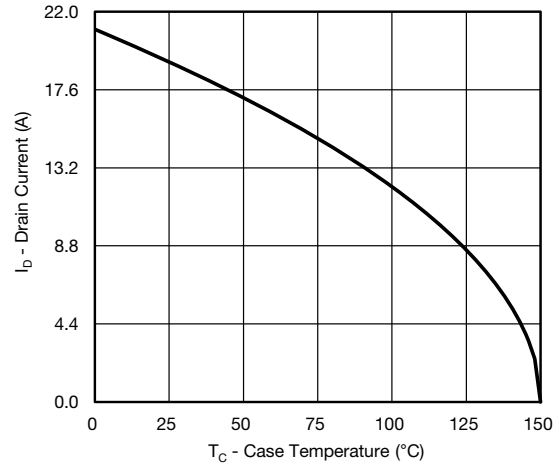


Single Pulse Power, Junction-to-Ambient

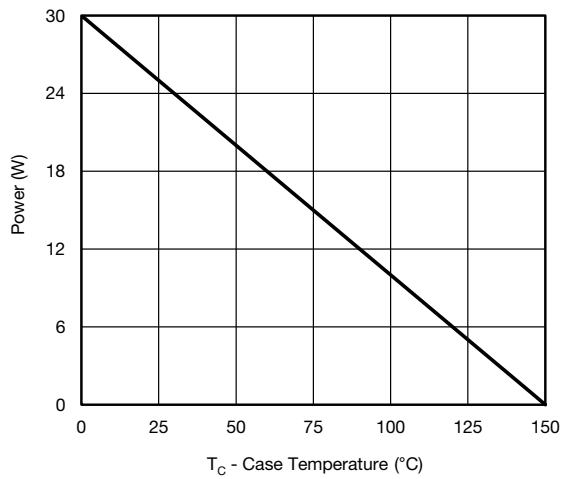


Safe Operating Area, Junction-to-Ambient

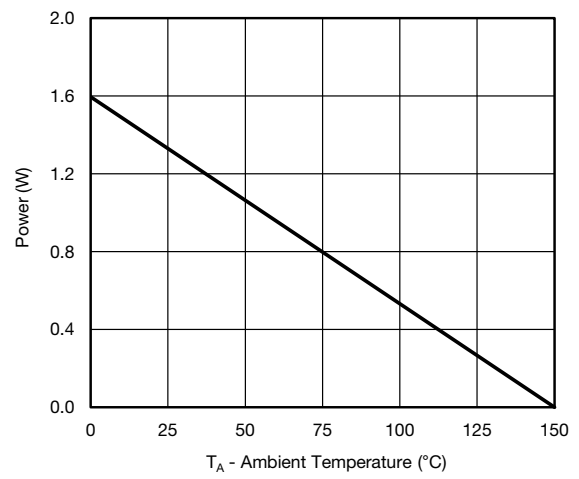
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



**Current Derating\***



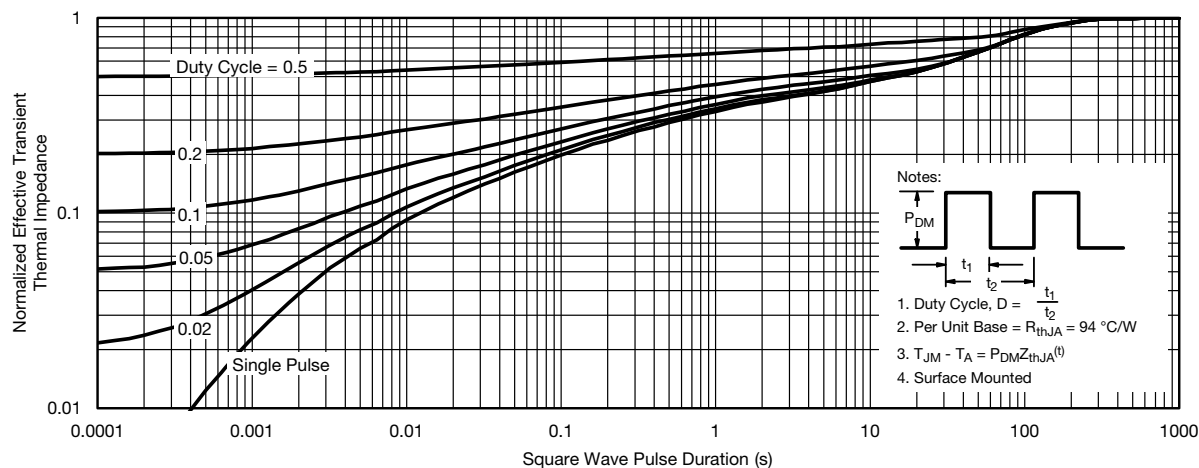
**Power, Junction-to-Case**



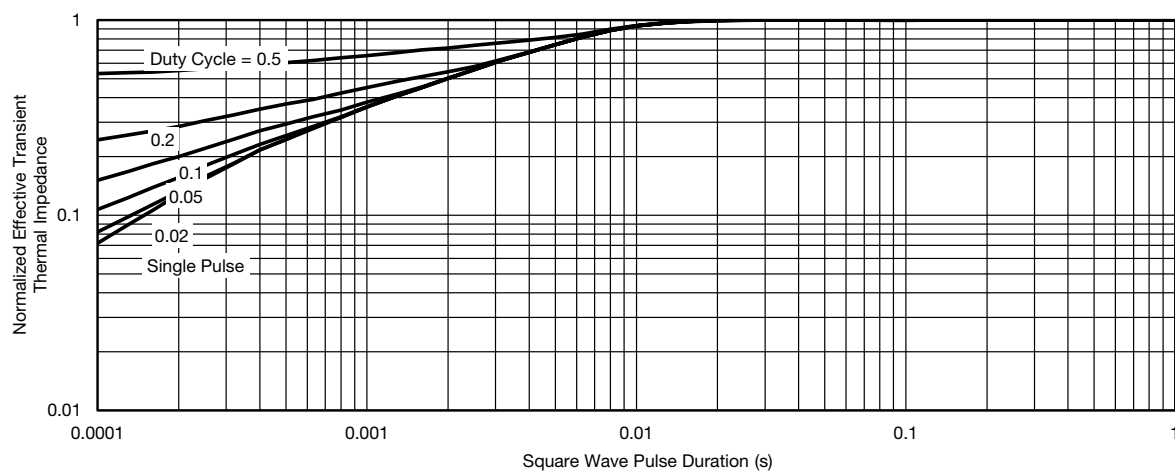
**Power, Junction-to-Ambient**

\* 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)

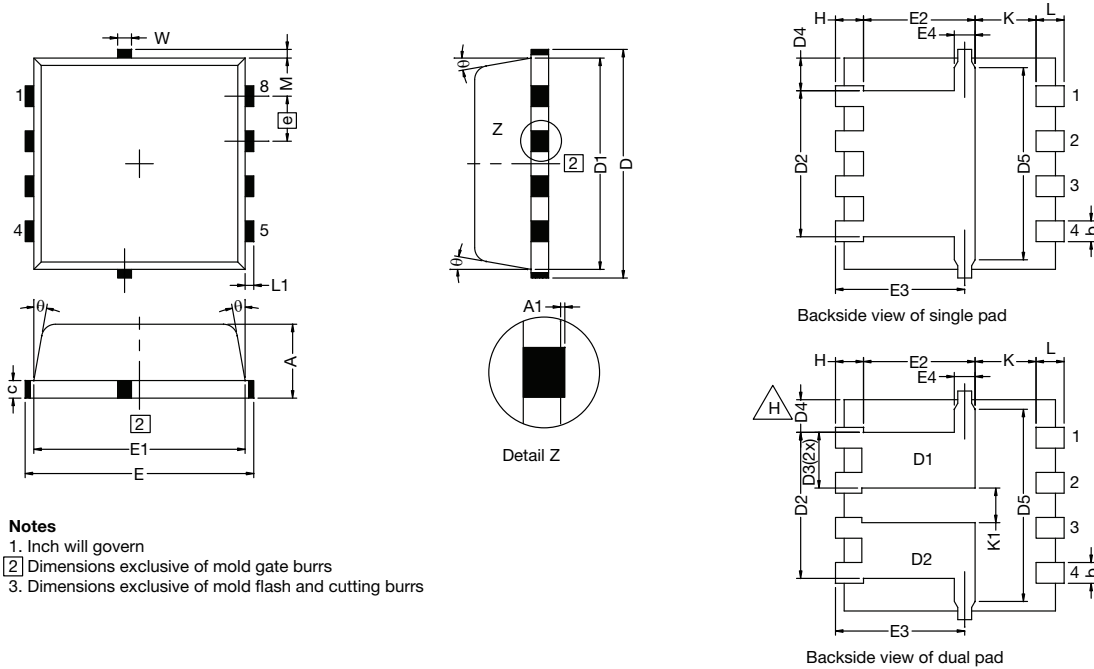


**Normalized Thermal Transient Impedance, Junction-to-Ambient**



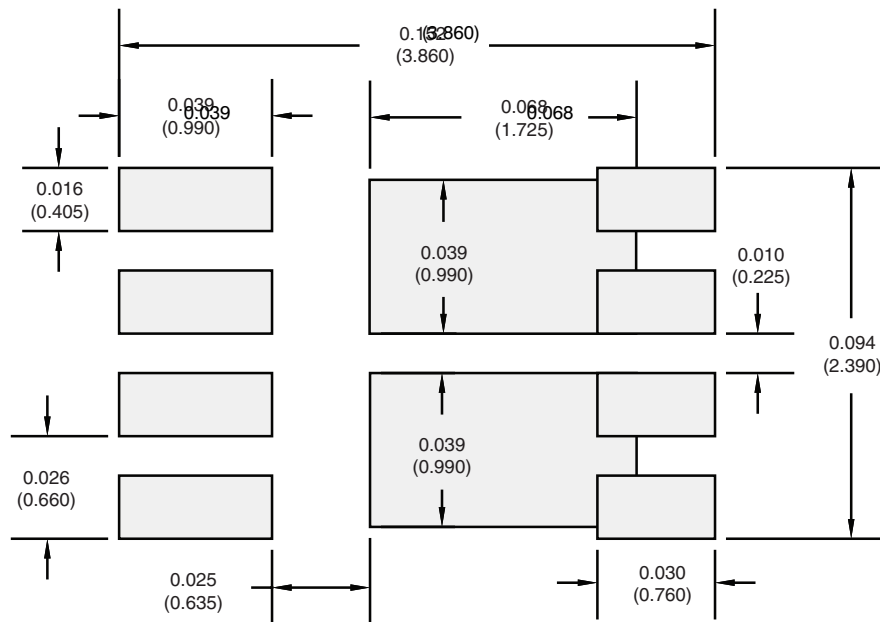
**Normalized Thermal Transient Impedance, Junction-to-Case**

## DFN3x3, (Single / Dual)



| DIM.                            | MILLIMETERS |      |      | INCHES     |       |       |
|---------------------------------|-------------|------|------|------------|-------|-------|
|                                 | MIN.        | NOM. | MAX. | MIN.       | NOM.  | MAX.  |
| A                               | 0.97        | 1.04 | 1.12 | 0.038      | 0.041 | 0.044 |
| A1                              | 0.00        | -    | 0.05 | 0.000      | -     | 0.002 |
| b                               | 0.23        | 0.30 | 0.41 | 0.009      | 0.012 | 0.016 |
| c                               | 0.23        | 0.28 | 0.33 | 0.009      | 0.011 | 0.013 |
| D                               | 3.20        | 3.30 | 3.40 | 0.126      | 0.130 | 0.134 |
| D1                              | 2.95        | 3.05 | 3.15 | 0.116      | 0.120 | 0.124 |
| D2                              | 1.98        | 2.11 | 2.24 | 0.078      | 0.083 | 0.088 |
| D3                              | 0.48        | -    | 0.89 | 0.019      | -     | 0.035 |
| D4                              | 0.47 typ.   |      |      | 0.0185 typ |       |       |
| D5                              | 2.3 typ.    |      |      | 0.090 typ  |       |       |
| E                               | 3.20        | 3.30 | 3.40 | 0.126      | 0.130 | 0.134 |
| E1                              | 2.95        | 3.05 | 3.15 | 0.116      | 0.120 | 0.124 |
| E2                              | 1.47        | 1.60 | 1.73 | 0.058      | 0.063 | 0.068 |
| E3                              | 1.75        | 1.85 | 1.98 | 0.069      | 0.073 | 0.078 |
| E4                              | 0.034 typ.  |      |      | 0.013 typ. |       |       |
| e                               | 0.65 BSC    |      |      | 0.026 BSC  |       |       |
| K                               | 0.86 typ.   |      |      | 0.034 typ. |       |       |
| K1                              | 0.35        | -    | -    | 0.014      | -     | -     |
| H                               | 0.30        | 0.41 | 0.51 | 0.012      | 0.016 | 0.020 |
| L                               | 0.30        | 0.43 | 0.56 | 0.012      | 0.017 | 0.022 |
| 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: S16-2667-Rev. M, 09-Jan-17 |             |      |      |            |       |       |
| DWG: 5882                       |             |      |      |            |       |       |

RECOMMENDED MINIMUM PADS FOR DFN 3x3 Dual



Recommended Minimum PADS for PowerPAK 1212-8 Dual  
Dimensions in Inches/(mm)



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