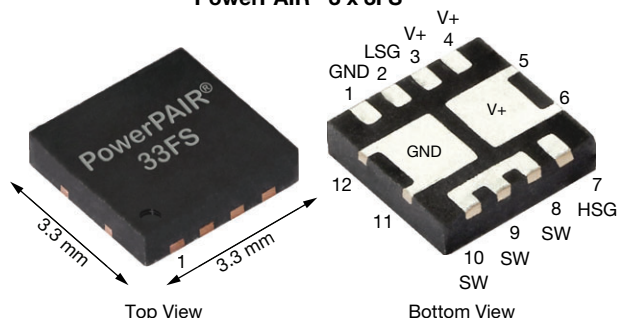


Dual N-Channel 30 V (D-S) MOSFET

PowerPAIR® 3 x 3FS


FEATURES

- TrenchFET® Gen V power MOSFET
- Symmetric dual N-channel
- Flip chip technology optimal thermal design
- High side and low side MOSFETs form optimized combination for 50 % duty cycle
- Optimized $R_{DS(on)}$ - Q_g and $R_{DS(on)}$ - Q_{gd} FOM elevates efficiency for high frequency switching
- 100 % R_g and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

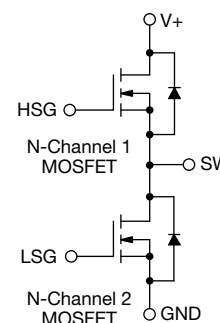

RoHS
COMPLIANT
HALOGEN
FREE

PRODUCT SUMMARY

| | |
|--|------------------|
| V_{DS} (V) | 30 |
| $R_{DS(on)}$ max. (Ω) at $V_{GS} = 10$ V | 0.00243 |
| $R_{DS(on)}$ max. (Ω) at $V_{GS} = 4.5$ V | 0.00351 |
| Q_g typ. (nC) | 9.5 |
| I_D (A) | 125 ^a |
| Configuration | Dual |

APPLICATIONS

- Synchronous buck
- Computer / server peripherals
- Half bridge
- POL
- Telecom DC/DC



ORDERING INFORMATION

| | |
|---------------------------------|-------------------|
| Package | PowerPAIR 3 x 3FS |
| Lead (Pb)-free and halogen-free | SiZF5300DT-T1-GE3 |

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

| PARAMETER | SYMBOL | LIMIT | UNIT |
|---|----------------|---------------------|------|
| Drain-source voltage | V_{DS} | 30 | V |
| Gate-source voltage | V_{GS} | +16 / -12 | |
| Continuous drain current ($T_J = 150$ °C) | $T_C = 25$ °C | 125 | A |
| | $T_C = 70$ °C | 100 | |
| | $T_A = 25$ °C | 35 ^{b, c} | |
| | $T_A = 70$ °C | 28 ^{b, c} | |
| Pulsed drain current ($t = 100$ μ s) | I_{DM} | 150 | A |
| Continuous source current (MOSFET diode conduction) | $T_C = 25$ °C | 47.3 | |
| | $T_A = 25$ °C | 3.7 ^{b, c} | mJ |
| Single pulse avalanche current | $L = 0.1$ mH | 20 | |
| Single pulse avalanche energy | E_{AS} | 20 | W |
| Maximum power dissipation | $T_C = 25$ °C | 56.8 | |
| | $T_C = 70$ °C | 36.4 | |
| | $T_A = 25$ °C | 4.5 ^{b, c} | |
| | $T_A = 70$ °C | 2.9 ^{b, c} | |
| Operating junction and storage temperature range | T_J, T_{stg} | -55 to +150 | °C |
| Soldering recommendations (peak temperature) | | 260 | |

Notes

- $T_C = 25$ °C
- Surface mounted on 1" x 1" FR4 board
- $t = 10$ s

**THERMAL RESISTANCE RATINGS**

| PARAMETER | | SYMBOL | TYPICAL | MAXIMUM | UNIT |
|---|---------------|------------|---------|---------|------|
| Maximum junction-to-ambient ^{a, b} | $t \leq 10$ s | R_{thJA} | 22 | 28 | °C/W |
| Maximum junction-to-case (drain) | Steady state | R_{thJC} | 1.7 | 2.2 | |

Notes

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

b. Maximum under steady state conditions is 64 °C/W

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 = 1 mA | 30 | - | - | V |
| Gate-source threshold voltage | V _{GS(th)} | V _{DS} = V _{GS} , I _D = 250 μA | 1 | - | 2 | |
| Gate-source leakage | I _{GSS} | V _{DS} = 0 V, V _{GS} = +16 V / -12 V | - | - | ± 100 | nA |
| Zero gate voltage drain current | I _{DSS} | V _{DS} = 24 V, V _{GS} = 0 V | - | - | 1 | μA |
| | | V _{DS} = 24 V, V _{GS} = 0 V, T _J = 55 °C | - | - | 5 | |
| On-state drain current ^a | I _{D(on)} | V _{DS} ≥ 5 V, V _{GS} = 10 V | 30 | - | - | A |
| Drain-source on-state resistance ^a | R _{DS(on)} | V _{GS} = 10 V, I _D = 10 A | - | 0.00202 | 0.00243 | Ω |
| | | V _{GS} = 4.5 V, I _D = 7 A | - | 0.00293 | 0.00351 | |
| Forward transconductance ^a | g _{fs} | V _{DS} = 10 V, I _D = 10 A | - | 61 | - | S |
| Dynamic ^b | | | | | | |
| Input capacitance | C _{iss} | V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz | - | 1480 | - | pF |
| Output capacitance | C _{oss} | | - | 500 | - | |
| Reverse transfer capacitance | C _{rss} | | - | 35 | - | |
| C _{rss} /C _{iss} ratio | | | - | 0.023 | 0.055 | |
| Total gate charge | Q _g | V _{DS} = 15 V, V _{GS} = 10 V, I _D = 20 A | - | 21 | 32 | nC |
| Gate-source charge | Q _{gs} | V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 20 A | - | 9.5 | 15 | |
| Gate-drain charge | Q _{gd} | | - | 5.5 | - | |
| | | | - | 1.7 | - | |
| Gate resistance | R _g | f = 1 MHz | 0.18 | 0.9 | 1.8 | Ω |
| Turn-on delay time | t _{d(on)} | V _{DD} = 15 V, R _L = 1 Ω, I _D ≅ 15 A, V _{GEN} = 10 V, R _g = 1 Ω | - | 12 | 24 | ns |
| Rise time | t _r | | - | 8 | 16 | |
| Turn-off delay time | t _{d(off)} | | - | 25 | 50 | |
| Fall time | t _f | | - | 6 | 12 | |
| Turn-on delay time | t _{d(on)} | V _{DD} = 15 V, R _L = 1 Ω, I _D ≅ 15 A, V _{GEN} = 4.5 V, R _g = 1 Ω | - | 22 | 44 | |
| Rise time | t _r | | - | 48 | 96 | |
| Turn-off delay time | t _{d(off)} | | - | 22 | 44 | |
| Fall time | t _f | | - | 12 | 24 | |
| Drain-source Body Diode Characteristics | | | | | | |
| Continuous source-drain diode current | I _S | T _C = 25°C | - | - | 47.3 | A |
| Pulse diode forward current | I _{SM} | | - | - | 150 | |
| Body diode voltage | V _{SD} | I _S = 15 A, V _{GS} = 0 V | - | 0.85 | 1.2 | V |
| Body diode reverse recovery time | t _{rr} | I _F = 15 A, di/dt = 100 A/μs, T _J = 25 °C | - | 17 | 34 | ns |
| Body diode reverse recovery charge | Q _{rr} | | - | 6 | 12 | nC |
| Reverse recovery fall time | t _a | | - | 9 | - | ns |
| Reverse recovery rise time | t _b | | - | 8 | - | |

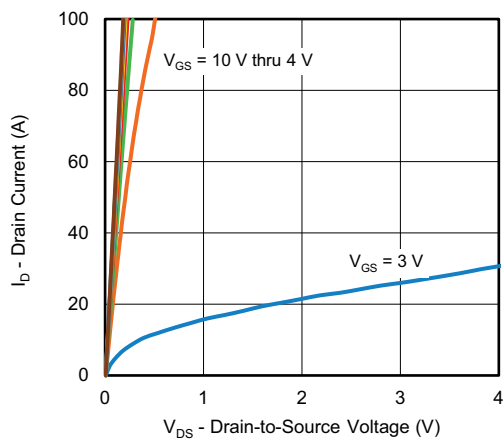
Notesa. Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %

b. Guaranteed by design, not subject to production testing

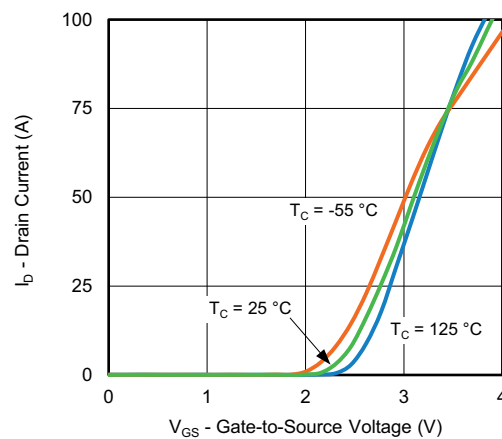
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



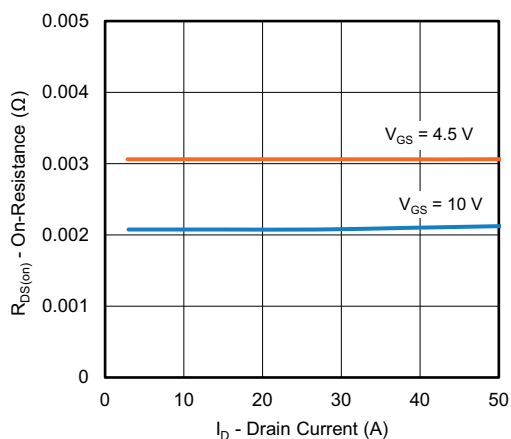
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



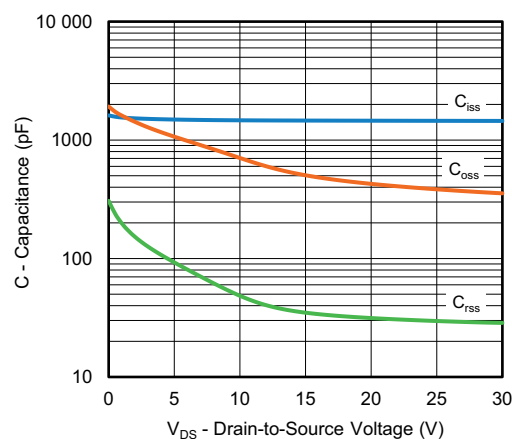
Output Characteristics



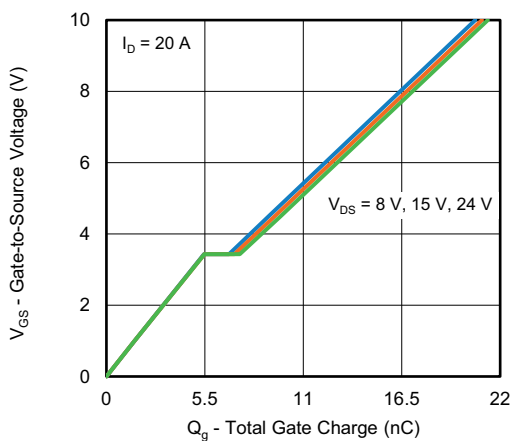
Transfer Characteristics



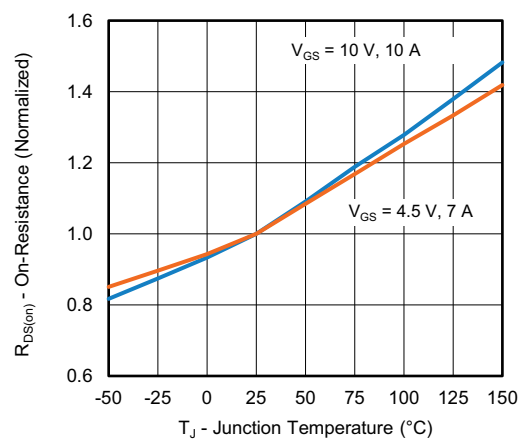
On-Resistance vs. Drain Current and Gate



Capacitance



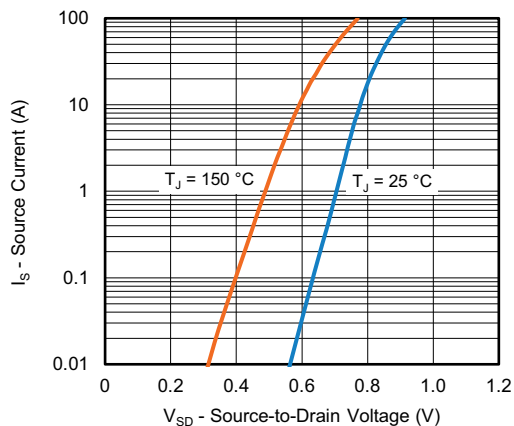
Gate Charge



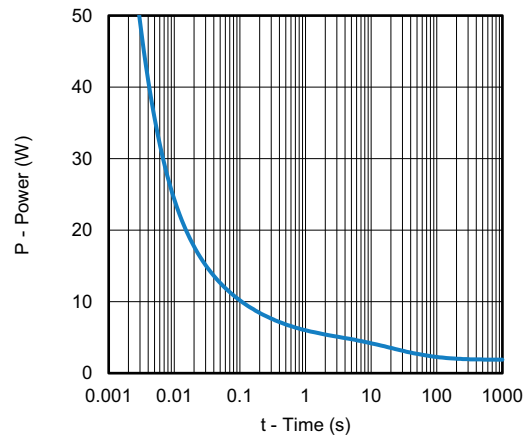
On-Resistance vs. Junction Temperature



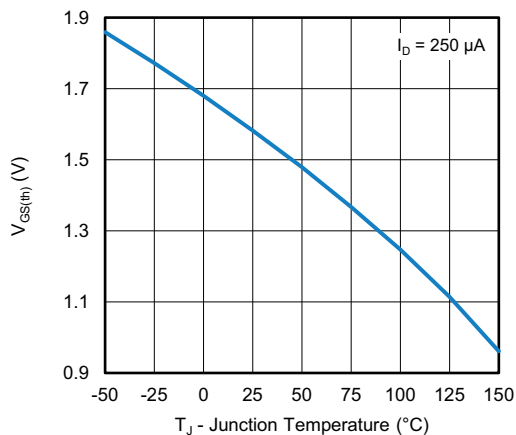
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



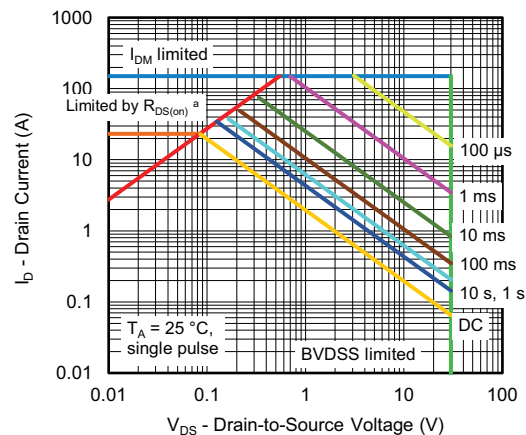
Source-Drain Diode Forward Voltage



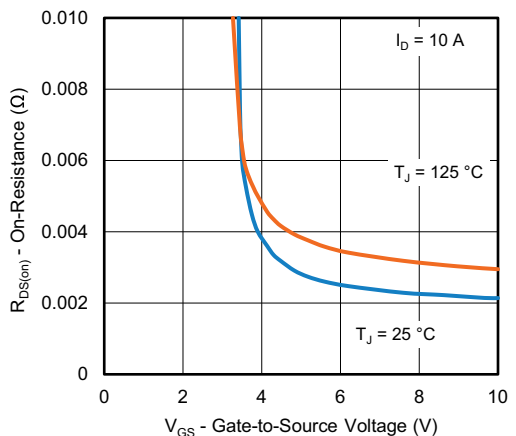
Single Pulse Power



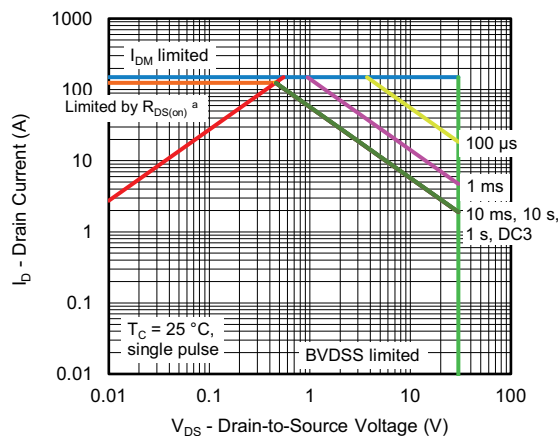
Threshold Voltage



Safe Operating Area, Junction to Ambient



On-Resistance vs. Gate-to-Source Voltage



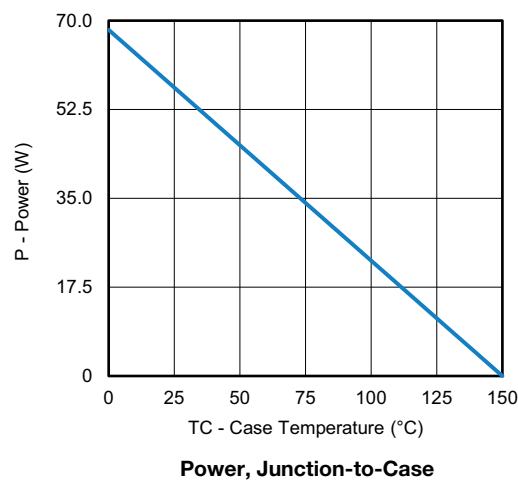
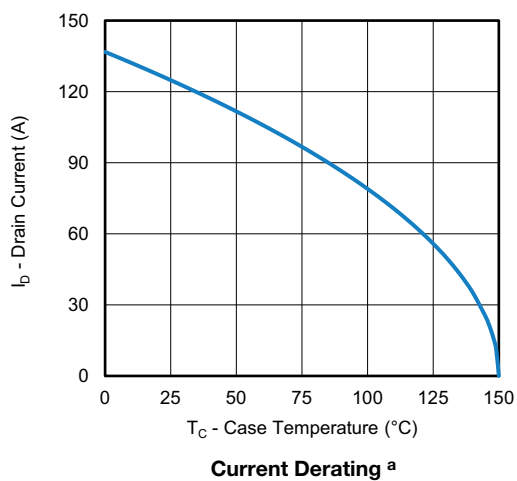
Safe Operating Area, Junction to Case

Note

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



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

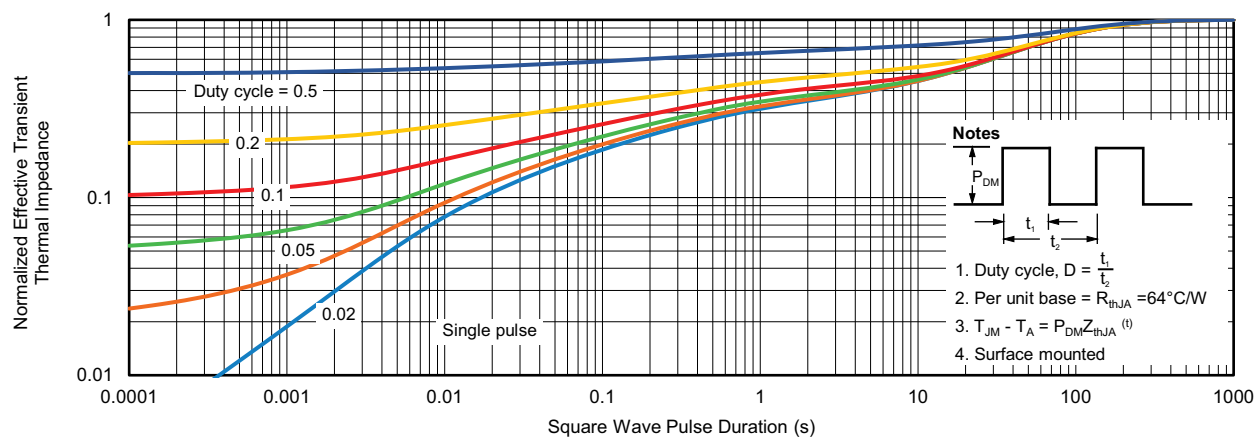


Notes

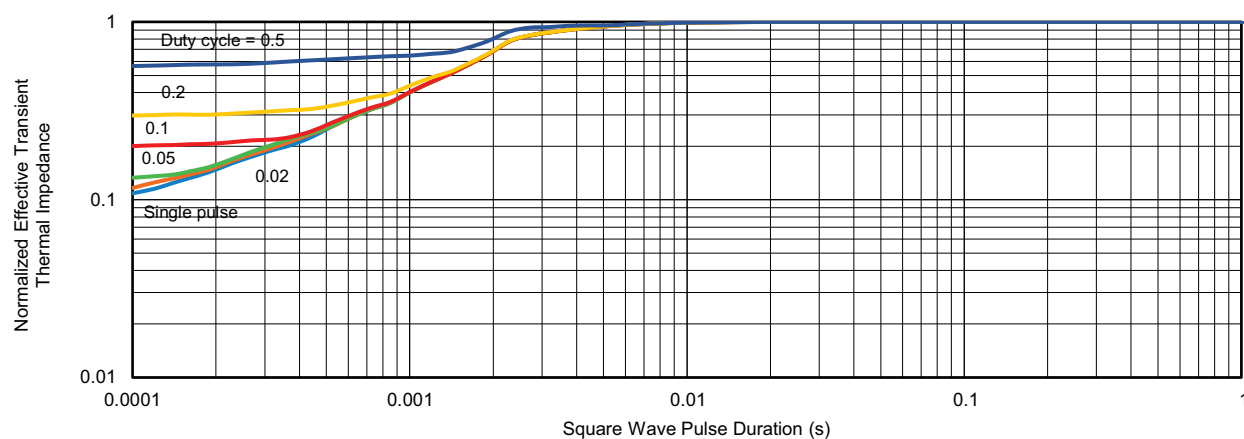
- The power dissipation P_D is based on T_J max. = 150 °C, using junction-to-ambient thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit
- $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



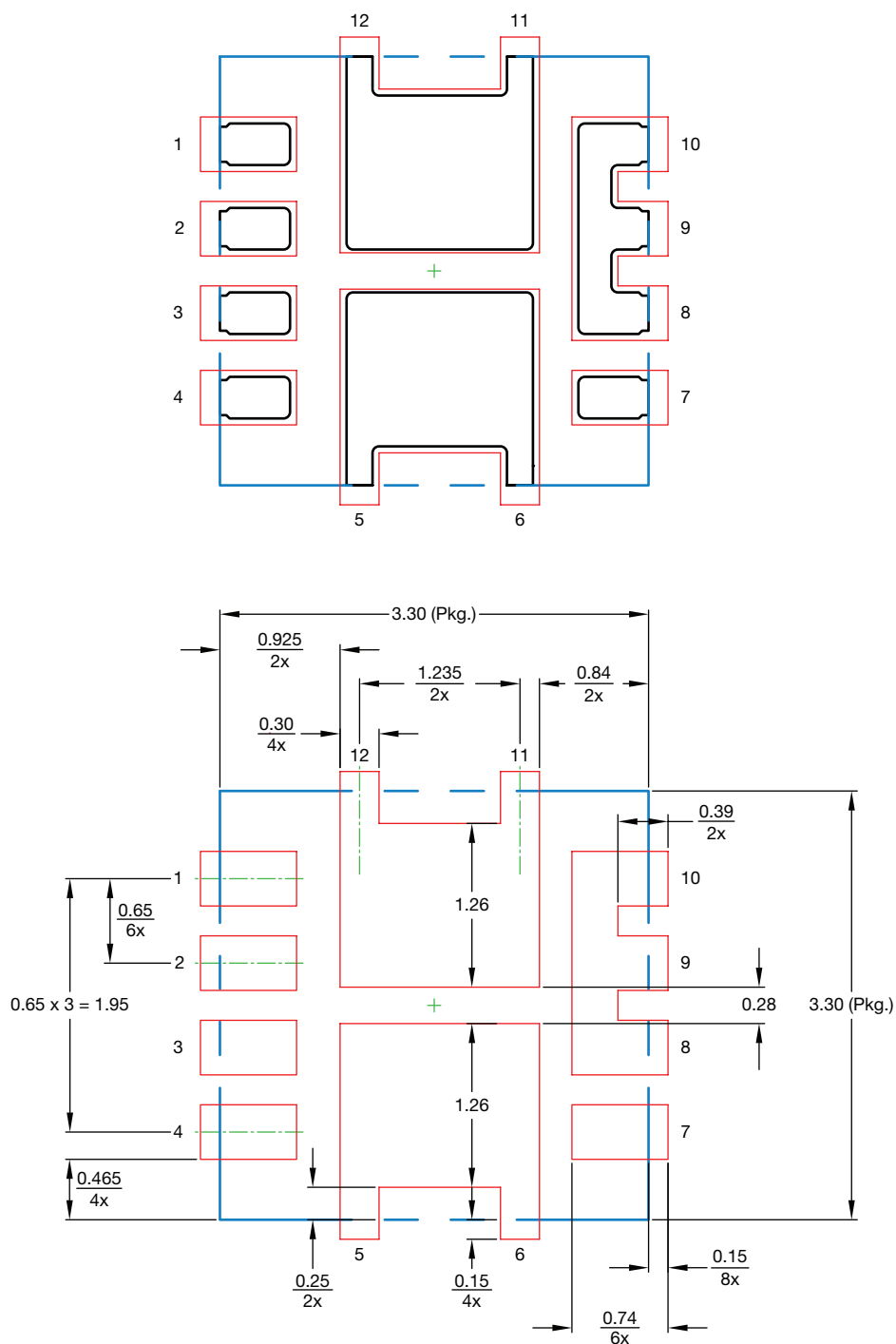
Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

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Recommended Land Pattern



Note

- Dimensions in mm

ECN: T22-0116-Rev. A, 14-Mar-2022
DWG: 3006



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