

Automotive N-Channel 100 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

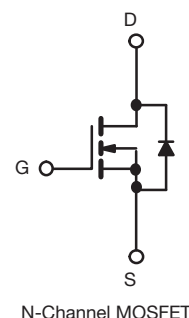
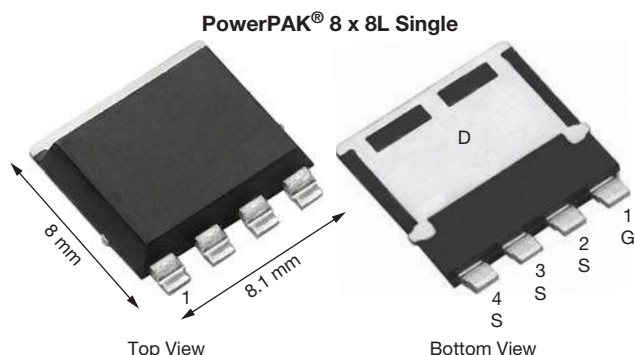
| | |
|---|-----------------|
| V_{DS} (V) | 100 |
| $R_{DS(on)}$ (Ω) at $V_{GS} = 10$ V | 0.0034 |
| $R_{DS(on)}$ (Ω) at $V_{GS} = 4.5$ V | 0.0040 |
| I_D (A) | 135 |
| Configuration | Single |
| Package | PowerPAK 8 x 8L |

FEATURES

- TrenchFET® power MOSFET
- AEC-Q101 qualified
- 100 % R_g and UIS tested
- Fully lead (Pb)-free device
- Thin 1.9 mm height
- Material categorization:
for definitions of compliance please see
www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE



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

| PARAMETER | SYMBOL | LIMIT | UNIT |
|--|----------------|----------------|------|
| Drain-Source Voltage | V_{DS} | 100 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | |
| Continuous Drain Current | I_D | $T_C = 25$ °C | 135 |
| | | $T_C = 125$ °C | 78 |
| Continuous Source Current (Diode Conduction) | I_S | 124 | A |
| Pulsed Drain Current ^a | I_{DM} | 210 | |
| Single Pulse Avalanche Current | I_{AS} | 68 | |
| Single Pulse Avalanche Energy | E_{AS} | 231 | mJ |
| Maximum Power Dissipation | P_D | $T_C = 25$ °C | 136 |
| | | $T_C = 125$ °C | 45 |
| Operating Junction and Storage Temperature Range | T_J, T_{stg} | -55 to +175 | °C |
| Soldering Recommendations (Peak Temperature) ^{c, d} | | 260 | |

THERMAL RESISTANCE RATINGS

| PARAMETER | SYMBOL | LIMIT | UNIT |
|--------------------------|------------|-------|------|
| Junction-to-Ambient | R_{thJA} | 50 | °C/W |
| Junction-to-Case (Drain) | R_{thJC} | 1.1 | |

Notes

- Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %.
- When mounted on 1" square PCB (FR4 material).
- See solder profile (www.vishay.com/doc?73257). The PowerPAK 8 x 8L 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.



| SPECIFICATIONS (T _C = 25 °C, unless otherwise noted) | | | | | | | |
|---|---------------------|--|--|------|--------|--------|------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN. | TYP. | MAX. | UNIT |
| Static | | | | | | | |
| Drain-Source Breakdown Voltage | V _{DS} | V _{GS} = 0, I _D = 250 μA | | 100 | - | - | V |
| Gate-Source Threshold Voltage | V _{GS(th)} | V _{DS} = V _{GS} , I _D = 250 μA | | 1.5 | 2 | 2.5 | |
| Gate-Source Leakage | I _{GSS} | V _{DS} = 0 V, V _{GS} = ± 20 V | | - | - | ± 100 | nA |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{GS} = 0 V | V _{DS} = 100 V | - | - | 1 | μA |
| | | V _{GS} = 0 V | V _{DS} = 100 V, T _J = 125 °C | - | - | 50 | |
| | | V _{GS} = 0 V | V _{DS} = 100 V, T _J = 175 °C | - | - | 500 | |
| On-State Drain Current ^a | I _{D(on)} | V _{GS} = 10 V | V _{DS} ≥ 5 V | 50 | - | - | A |
| Drain-Source On-State Resistance ^a | R _{DS(on)} | V _{GS} = 10 V | I _D = 20 A | - | 0.0028 | 0.0034 | Ω |
| | | V _{GS} = 4.5 V | I _D = 10 A | - | 0.0033 | 0.0040 | |
| | | V _{GS} = 10 V | I _D = 20 A, T _J = 125 °C | - | - | 0.0058 | |
| | | V _{GS} = 10 V | I _D = 20 A, T _J = 175 °C | - | - | 0.0074 | |
| Forward Transconductance ^b | g _{fs} | V _{DS} = 15 V, I _D = 15 A | | - | 84 | - | S |
| Dynamic ^b | | | | | | | |
| Input Capacitance | C _{iss} | V _{GS} = 0 V | V _{DS} = 25 V, f = 1 MHz | - | 5620 | 7350 | pF |
| Output Capacitance | C _{oss} | | | - | 2850 | 3750 | |
| Reverse Transfer Capacitance | C _{rss} | | | - | 220 | 290 | |
| Total Gate Charge ^c | Q _g | V _{GS} = 10 V | V _{DS} = 50 V, I _D = 10 A | - | 97 | 150 | nC |
| Gate-Source Charge ^c | Q _{gs} | | | - | 15 | - | |
| Gate-Drain Charge ^c | Q _{gd} | | | - | 20 | - | |
| Gate Resistance | R _g | f = 1 MHz | | 0.95 | 1.92 | 3 | Ω |
| Turn-On Delay Time ^c | t _{d(on)} | V _{DD} = 50 V, R _L = 5 Ω I _D ≥ 10 A, V _{GEN} = 10 V, R _g = 1 Ω | | - | 19 | 30 | ns |
| Rise Time ^c | t _r | | | - | 40 | 60 | |
| Turn-Off Delay Time ^c | t _{d(off)} | | | - | 69 | 110 | |
| Fall Time ^c | t _f | | | - | 87 | 135 | |
| Source-Drain Diode Ratings and Characteristics ^b | | | | | | | |
| Pulsed Current ^a | I _{SM} | | | - | - | 210 | A |
| Forward Voltage | V _{SD} | I _F = 40 A, V _{GS} = 0 V | | - | 0.83 | 1.2 | V |

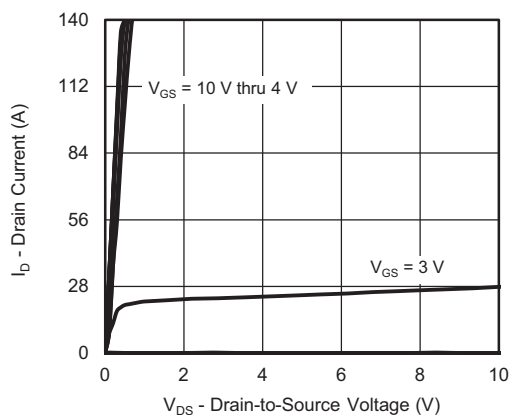
Notes

- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

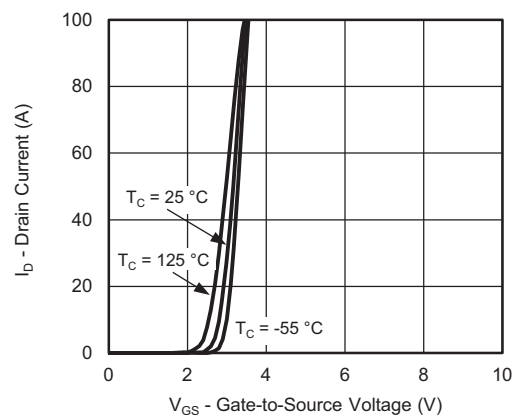
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



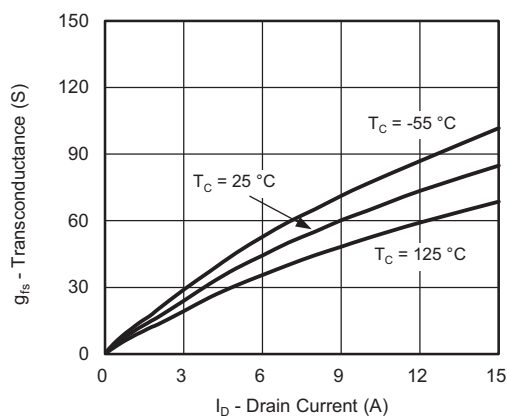
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



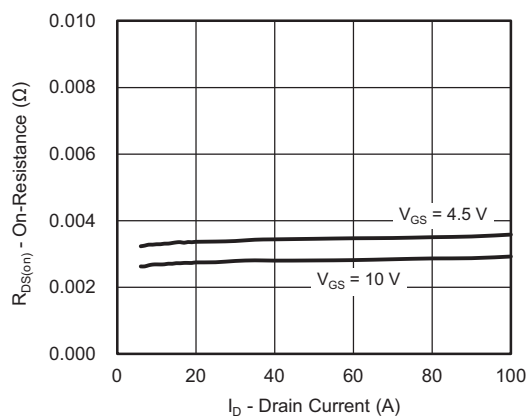
Output Characteristics



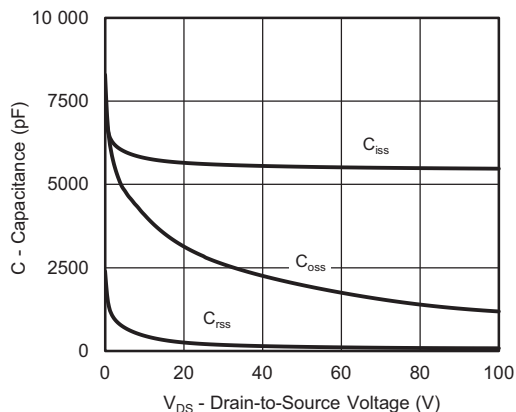
Transfer Characteristics



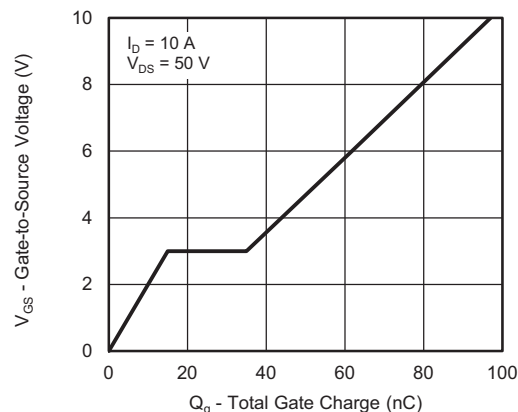
Transconductance



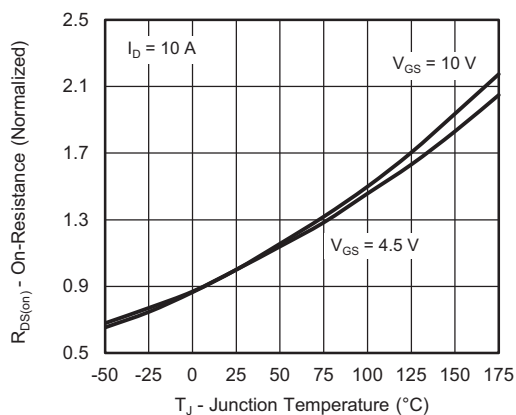
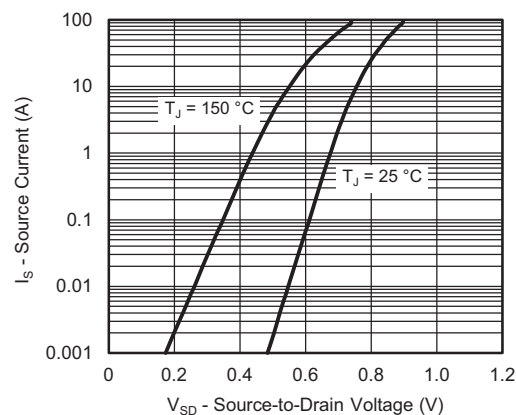
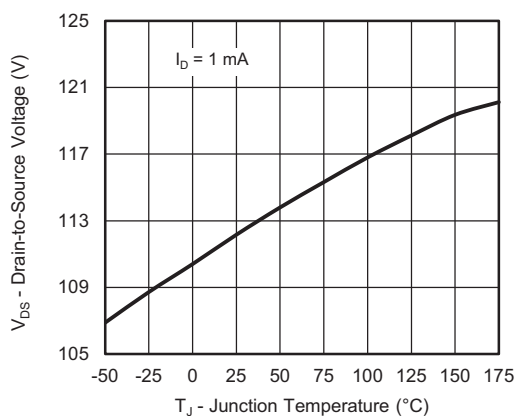
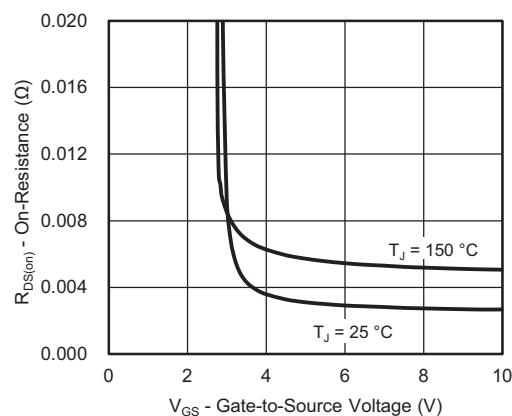
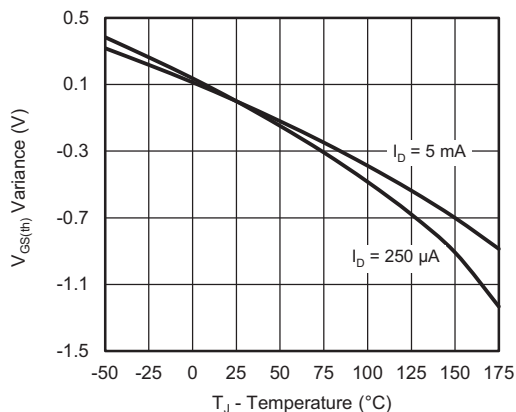
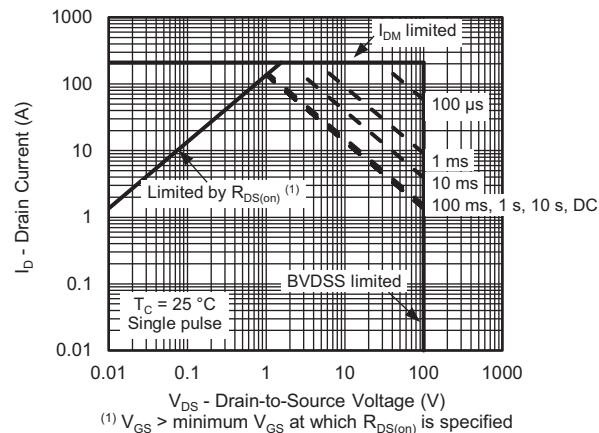
On-Resistance vs. Drain Current



Capacitance

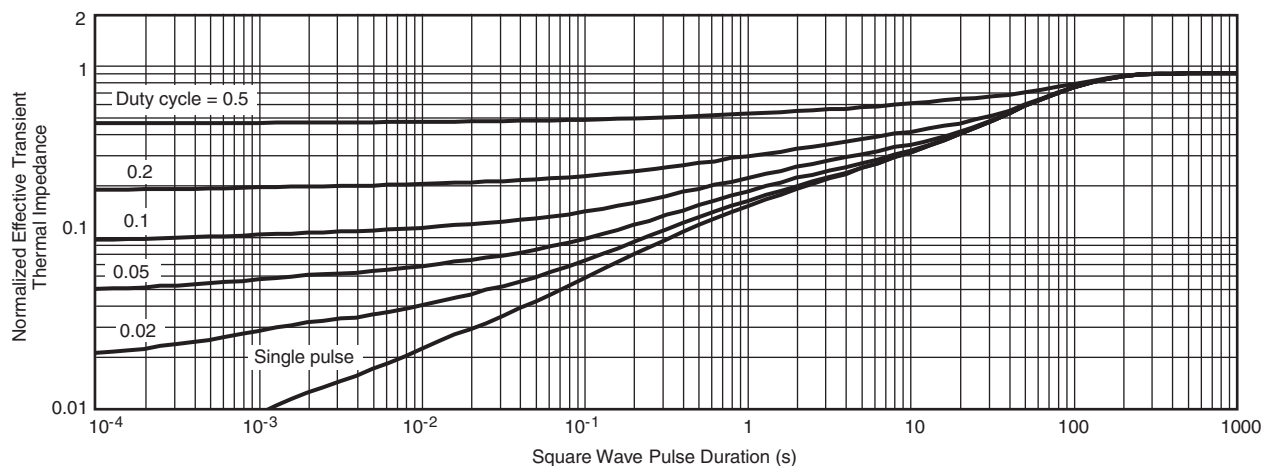


Gate Charge

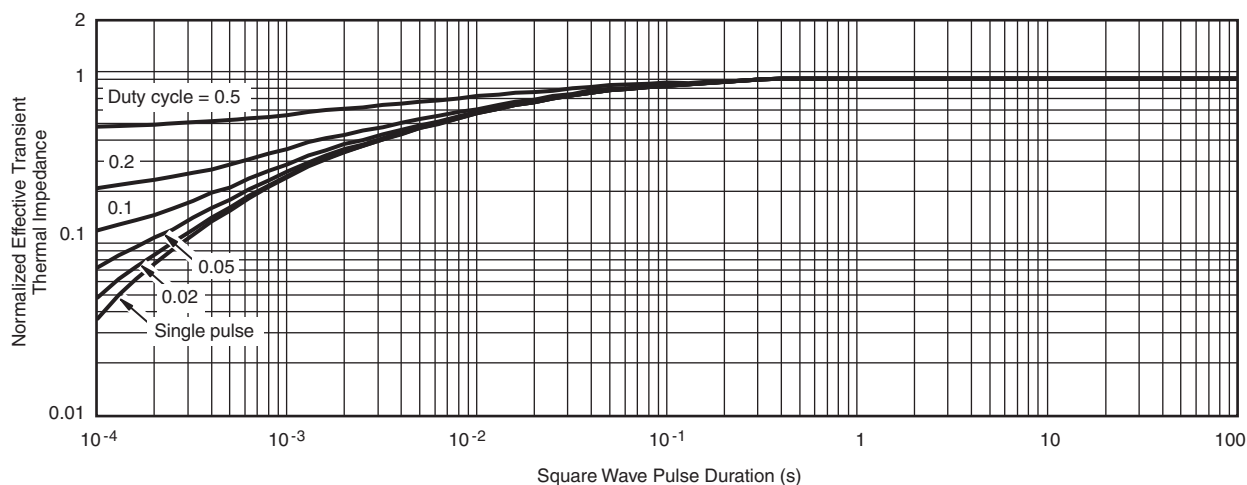
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

On-Resistance vs. Junction Temperature

Source Drain Diode Forward Voltage

Drain Source Breakdown vs. Junction Temperature

On-Resistance vs. Gate-to-Source Voltage

Threshold Voltage

Safe Operating Area



THERMAL RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

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PowerPAK® 8 x 8L

Ordering codes for the SQ rugged series power MOSFETs in the PowerPAK 8 x 8L package:

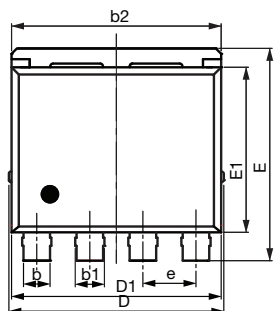
| DATASHEET PART NUMBER | OLD ORDERING CODE ^a | NEW ORDERING CODE |
|-----------------------|--------------------------------|-------------------|
| SQJQ100EL | - | SQJQ100EL-T1_GE3 |
| SQJQ402E | SQJQ402E-T1-GE3 | SQJQ402E-T1_GE3 |
| SQJQ410EL | - | SQJQ410EL-T1_GE3 |
| SQJQ900E | - | SQJQ900E-T1_GE3 |

Note

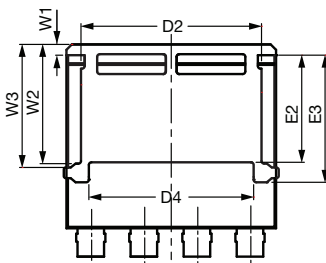
a. Old ordering code is obsolete and no longer valid for new orders



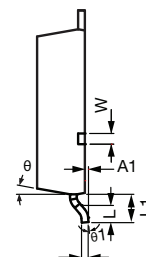
PowerPAK® 8 x 8L Case Outline



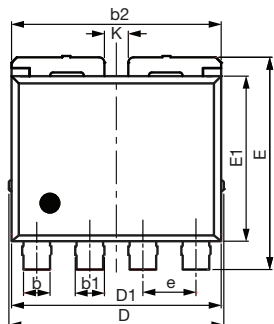
Top view (single)



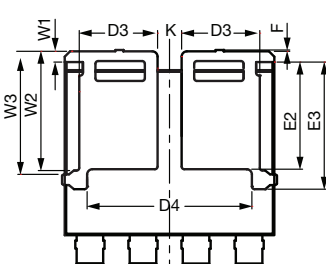
Bottom view (single)



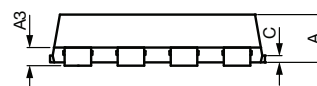
0.25 gauge line



Top view (dual)



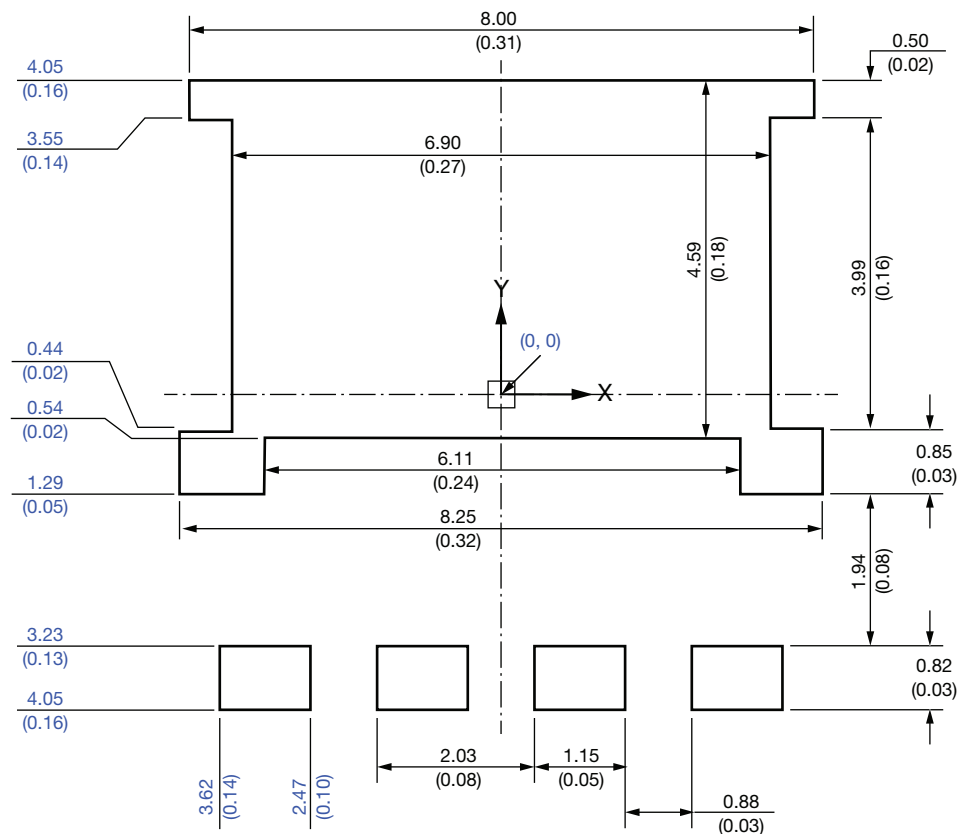
Bottom view (dual)



| DIM. | MILLIMETERS | | | INCHES | | |
|------|-------------|------|------|--------|-------|-------|
| | MIN. | NOM. | MAX. | MIN. | NOM. | MAX. |
| A | 1.70 | 1.80 | 1.90 | 0.067 | 0.071 | 0.075 |
| A1 | 0.00 | 0.08 | 0.13 | 0.000 | 0.003 | 0.005 |
| A3 | 0.55 | 0.62 | 0.70 | 0.022 | 0.024 | 0.028 |
| b | 0.92 | 1.00 | 1.08 | 0.036 | 0.039 | 0.043 |
| b1 | 1.02 | 1.10 | 1.18 | 0.040 | 0.043 | 0.046 |
| b2 | 7.80 | 7.90 | 8.00 | 0.307 | 0.311 | 0.315 |
| c | 0.20 | 0.25 | 0.30 | 0.008 | 0.010 | 0.012 |
| D | 8.00 | 8.10 | 8.25 | 0.315 | 0.319 | 0.325 |
| D1 | 7.80 | 7.90 | 8.00 | 0.307 | 0.311 | 0.315 |
| D2 | 6.70 | 6.80 | 6.90 | 0.264 | 0.268 | 0.272 |
| D3 | 2.85 | 2.95 | 3.05 | 0.112 | 0.116 | 0.120 |
| D4 | 6.11 | 6.21 | 6.31 | 0.241 | 0.244 | 0.248 |
| e | 1.95 | 2.00 | 2.05 | 0.077 | 0.079 | 0.081 |
| E | 7.90 | 8.00 | 8.10 | 0.311 | 0.315 | 0.319 |
| E1 | 6.12 | 6.22 | 6.32 | 0.241 | 0.245 | 0.249 |
| E2 | 3.94 | 4.04 | 4.14 | 0.140 | 0.159 | 0.163 |
| E3 | 4.69 | 4.79 | 4.89 | 0.185 | 0.189 | 0.193 |
| F | 0.05 | 0.10 | 0.15 | 0.002 | 0.004 | 0.006 |
| L | 0.62 | 0.72 | 0.82 | 0.024 | 0.028 | 0.032 |
| L1 | 0.92 | 1.07 | 1.22 | 0.036 | 0.042 | 0.048 |
| K | 0.80 | 0.90 | 1.00 | 0.031 | 0.035 | 0.039 |
| W | 0.30 | 0.40 | 0.50 | 0.012 | 0.016 | 0.020 |
| W1 | 0.30 | 0.40 | 0.50 | 0.012 | 0.016 | 0.020 |
| W2 | 4.39 | 4.49 | 4.59 | 0.173 | 0.177 | 0.181 |
| W3 | 4.54 | 4.64 | 4.74 | 0.179 | 0.183 | 0.187 |
| θ | 6° | 10° | 14° | 6° | 10° | 14° |
| θ1 | 0° | 3° | 8° | 0° | 3° | 8° |

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DWG: 6026

Recommended Minimum PADS for PowerPAK® 8 x 8L Single



Dimensions in millimeters (inches)

Note

- Linear dimensions are in black, the same information is provided in ordinate dimensions which are in blue.



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