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New Product

Si1300BDL
Vishay Siliconix

N-Channel 20-V (D-S) MOSFET

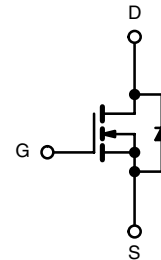
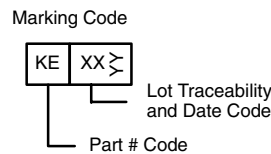
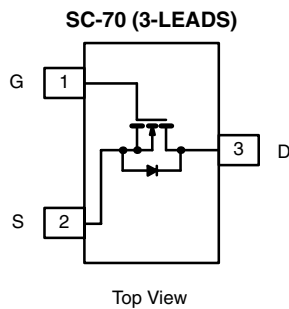


RoHS
COMPLIANT

| PRODUCT SUMMARY | | | |
|-----------------|---------------------------|------------------------|-------------|
| V_{DS} (V) | $r_{DS(on)}$ (Ω) | I_D (A) ^a | Q_g (Typ) |
| 20 | 0.85 at $V_{GS} = 4.5$ V | 0.4 | 335 |
| | 1.08 at $V_{GS} = 2.5$ V | 0.35 | |

FEATURES

- TrenchFET[®] Power MOSFET
- 100 % R_g Tested



Ordering Information: Si1300BDL-T1-E3

| ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C UNLESS OTHERWISE NOTED) | | | | |
|--|---------------|----------------|----------------------|------|
| Parameter | | Symbol | Limit | Unit |
| Drain-Source Voltage | | V_{DS} | 20 | V |
| Gate-Source Voltage | | V_{GS} | ± 8 | |
| Continuous Drain Current ($T_J = 150$ °C) | $T_C = 25$ °C | I_D | 0.4 | A |
| | $T_C = 70$ °C | | 0.32 | |
| | $T_A = 25$ °C | | 0.37 ^{b, c} | |
| | $T_A = 70$ °C | | 0.30 ^{b, c} | |
| Pulsed Drain Current | | I_{DM} | 0.5 | |
| Continuous Source-Drain Diode Current | $T_C = 25$ °C | I_S | 0.18 | |
| | $T_A = 25$ °C | | 0.14 ^{b, c} | |
| Maximum Power Dissipation | $T_C = 25$ °C | P_D | 0.2 | W |
| | $T_C = 70$ °C | | 0.14 | |
| | $T_A = 25$ °C | | 0.19 | |
| | $T_A = 70$ °C | | 0.12 ^{b, c} | |
| Operating Junction and Storage Temperature Range | | T_J, T_{stg} | -55 to 150 | °C |

| THERMAL RESISTANCE RATINGS | | | | | |
|---|----------------|------------|---------|---------|------|
| Parameter | | Symbol | Typical | Maximum | Unit |
| Maximum Junction-to-Ambient ^{b, d} | $t \leq 5$ sec | R_{thJA} | 540 | 670 | °C/W |
| Maximum Junction-to-Foot (Drain) | Steady State | R_{thJF} | 450 | 570 | |

Notes:

- Based on $T_C = 25$ °C.
- Surface mounted on 1" x 1" FR4 board.
- $t = 5$ sec
- Maximum under steady state conditions is 360 °C/W.

| SPECIFICATIONS (T _J = 25 °C UNLESS OTHERWISE NOTED) | | | | | | |
|--|--------------------------------------|---|------|------|------|-------|
| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | V _{DS} | V _{GS} = 0 V, I _D = 250 μA | 20 | | | V |
| V _{DS} Temperature Coefficient | ΔV _{DS} /T _J | I _D = 250 μA | | 20 | | mV/°C |
| V _{GS(th)} Temperature Coefficient | ΔV _{GS(th)} /T _J | | | -2.8 | | |
| Gate-Source Threshold Voltage | V _{GS(th)} | V _{DS} = V _{GS} , I _D = 250 μA | 0.4 | | 1.0 | V |
| Gate-Source Leakage | I _{GSS} | V _{DS} = 0 V, V _{GS} = ±8 V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = 20 V, V _{GS} = 0 V | | | 100 | nA |
| | | V _{DS} = 20 V, V _{GS} = 0 V, T _J = 55 °C | | | 5 | μA |
| On-State Drain Current ^a | I _{D(on)} | V _{DS} ≥ 5 V, V _{GS} = 4.5 V | 0.4 | | | A |
| | | V _{DS} ≥ 5 V, V _{GS} = 2.5 V | 0.12 | | | |
| Drain-Source On-State Resistance ^a | r _{DS(on)} | V _{GS} = 4.5 V, I _D = 0.25 | | 0.65 | 0.85 | Ω |
| | | V _{GS} = 2.5 V, I _D = 0.15 | | 0.85 | 1.08 | |
| Dynamic^b | | | | | | |
| Input Capacitance | C _{iss} | V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz | | 35 | | pF |
| Output Capacitance | C _{oss} | | | 13 | | |
| Reverse Transfer Capacitance | C _{rss} | | | 4 | | |
| Total Gate Charge | Q _g | V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 0.4 | | 560 | 840 | pC |
| | | V _{DS} = 10 V, V _{GS} = 2.5 V, I _D = 0.35 | | 335 | 503 | |
| Gate-Source Charge | Q _{gs} | | | 98 | | |
| Gate-Drain Charge | Q _{gd} | | 85 | | | |
| Gate Resistance | R _g | f = 1 MHz | | 7 | 12 | Ω |
| Turn-On Delay Time | t _{d(on)} | V _{DD} = 10 V, R _L = 25 Ω I _D = 0.4 A, V _{GEN} = 4.5 V, R _g = 1 Ω | | 7 | 12 | ns |
| Rise Time | t _r | | | 10 | 15 | |
| Turn-Off Delay Time | t _{d(off)} | | | 8 | 13 | |
| Fall Time | t _f | | | 7 | 12 | |
| Drain-Source Body Diode Characteristics | | | | | | |
| Continuous Source-Drain Diode Current | I _S | T _C = 25 °C | | | 0.18 | A |
| Pulse Diode Forward Current ^a | I _{SM} | | | | 0.4 | |
| Body Diode Voltage | V _{SD} | I _S = 0.05 A | | 0.7 | 1.2 | V |

Notes

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

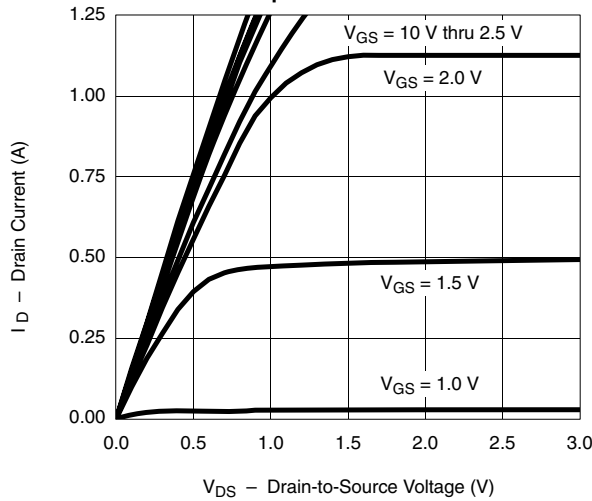
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



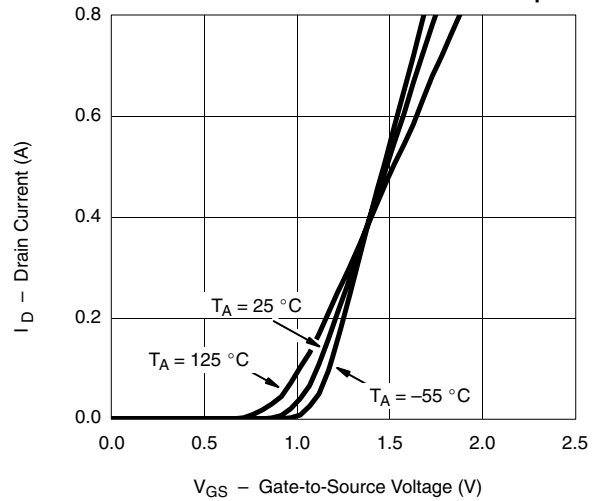
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TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

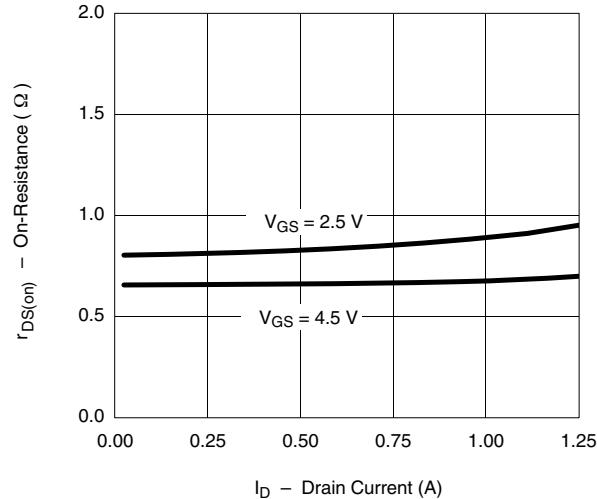
Output Characteristics



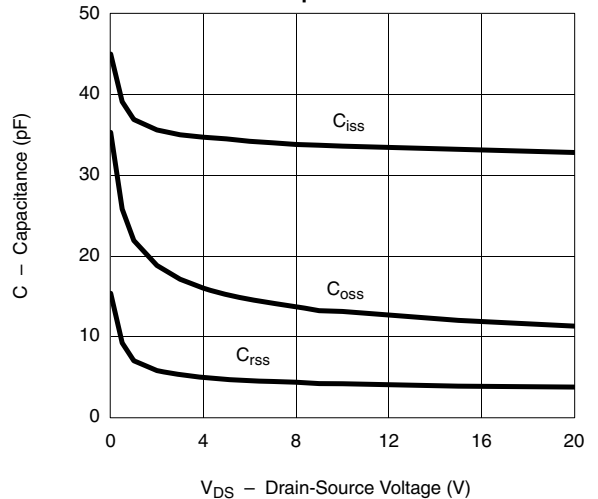
Transfer Characteristics curves vs. Temp



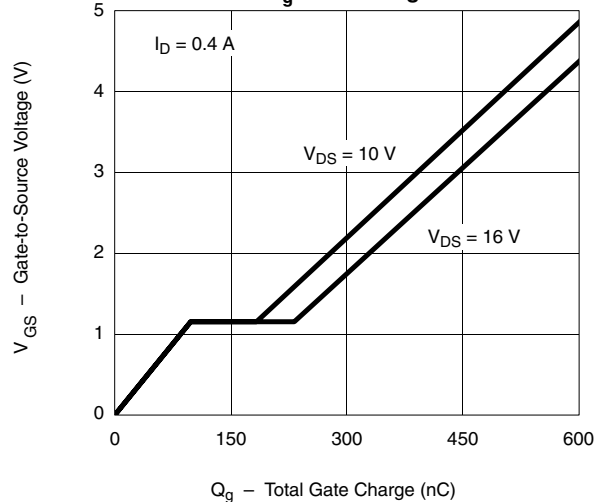
On-Resistance vs. Drain Current



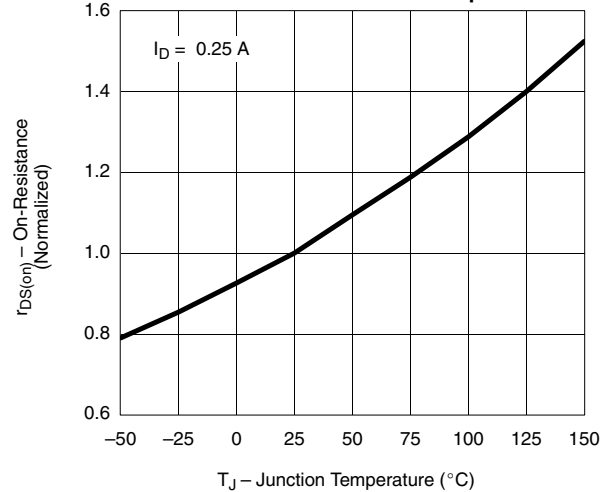
Capacitance



Qg - Gate Charge

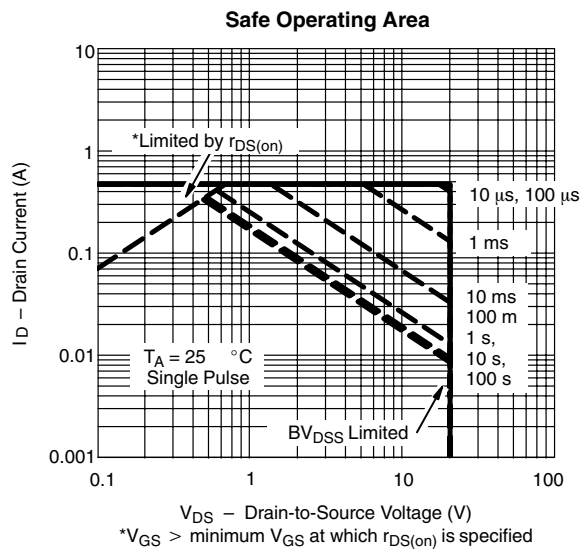
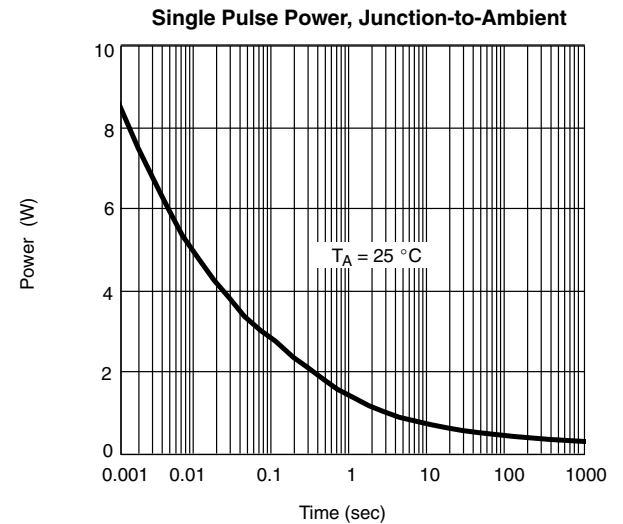
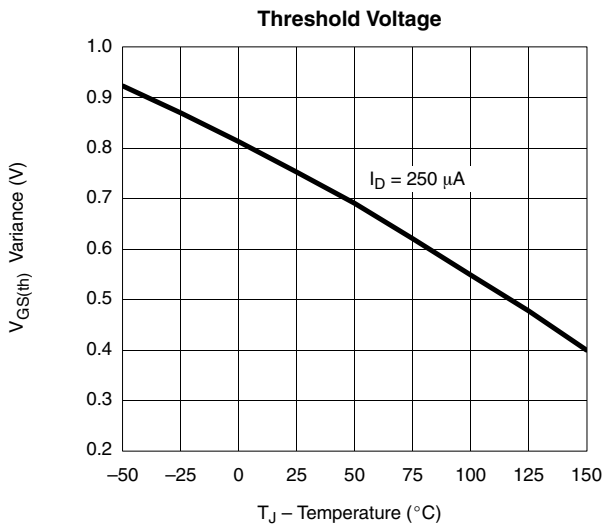
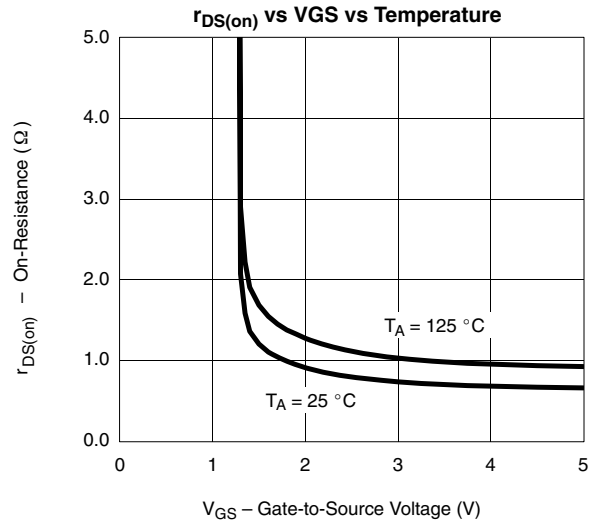
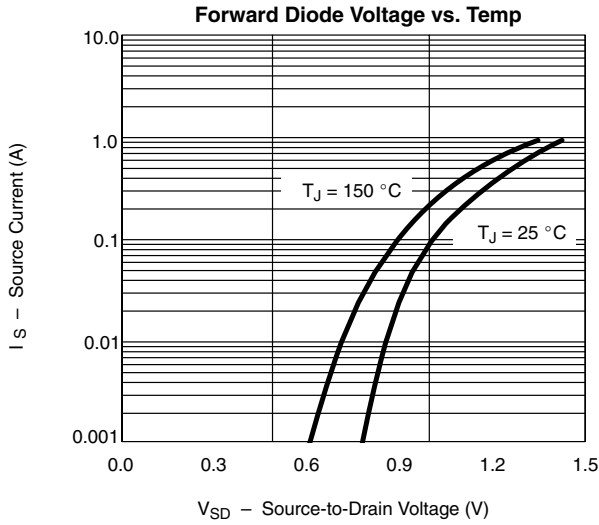


On-Resistance vs. Junction Temperature



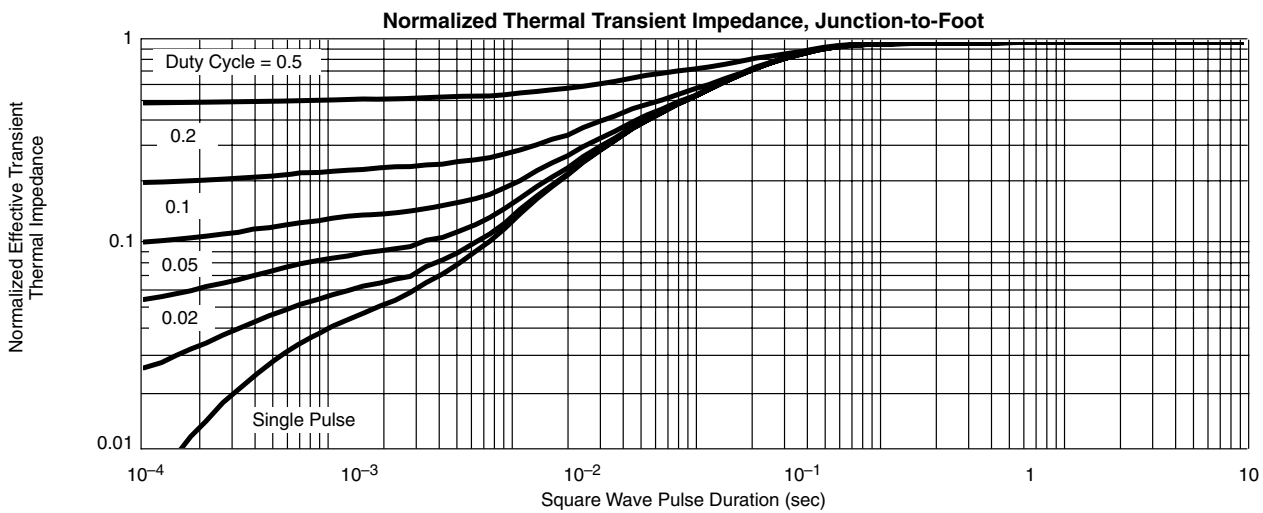
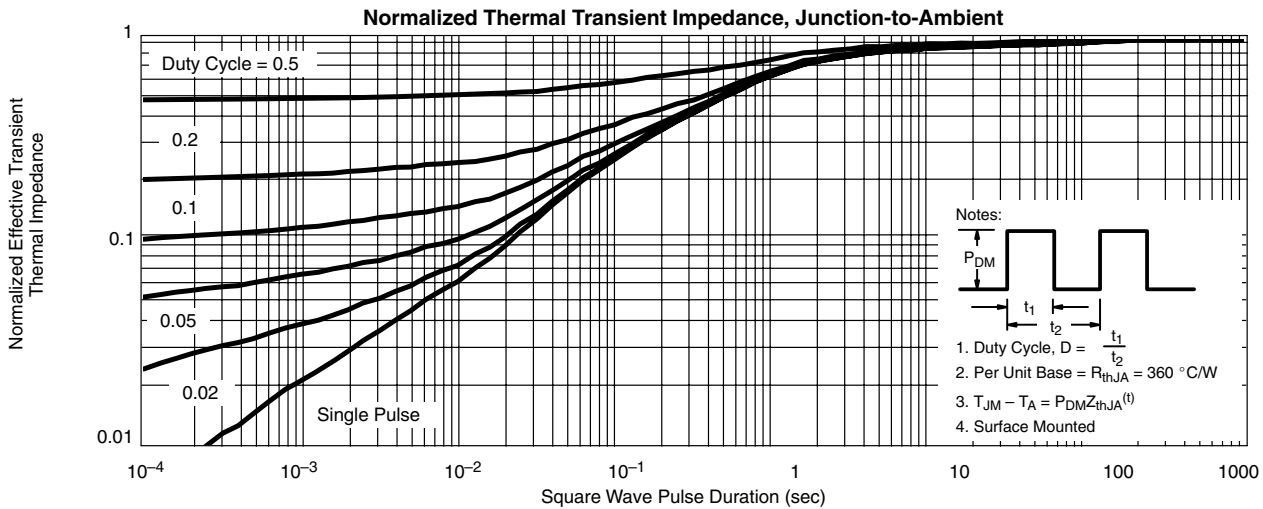


TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)





TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)



*The power dissipation P_D is based on $T_{J(max)} = 150 \text{ }^\circ\text{C}$, 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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