Si9945BDY

RoHS

COMPLIANT

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Vishay Siliconix

Dual N-Channel 60 V (D-S) MOSFET



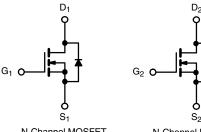
| PRODUCT SUMMARY | | | | | |
|--|-------|--|--|--|--|
| V _{DS} (V) | 60 | | | | |
| $R_{DS(on)}$ max. (Ω) at V_GS = 10 V | 0.058 | | | | |
| $R_{DS(on)}$ max. (Ω) at V_{GS} = 4.5 V | 0.072 | | | | |
| Q _g typ. (nC) | 13 | | | | |
| I _D (A) ^a | 5.3 | | | | |
| Configuration | Dual | | | | |

FEATURES

- TrenchFET[®] power MOSFET
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS

- LCD TV CCFL inverter
- · Load switch



N-Channel MOSFET

S2 N-Channel MOSFET

| ORDERING INFORMATION | | | | |
|---------------------------------|------------------|--|--|--|
| Package | SO-8 | | | |
| Lead (Pb)-free and halogen-free | Si9945BDY-T1-GE3 | | | |

| ABSOLUTE MAXIMUM RATINGS | $(T_A = 25 \ ^\circ C, unless)$ | s otherwise note | d) | | |
|--|---------------------------------|-----------------------------------|---------------------|------|--|
| PARAMETER | | SYMBOL | LIMIT | UNIT | |
| Drain-source voltage | | V _{DS} | 60 | V | |
| Gate-source voltage | | V _{GS} | ± 20 | v | |
| Continuous drain current (T _J = 150 °C) | T _C = 25 °C | | 5.3 | | |
| | T _C = 70 °C | | 4.3 | | |
| | T _A = 25 °C | I _D | 4.3 ^{b, c} | | |
| | T _A = 70 °C | | 3.4 ^{b, c} | • | |
| Pulsed drain current (10 µs width) | | I _{DM} | 20 | — A | |
| Continuous source-drain diode current | T _C = 25 °C | | 2.6 | | |
| | T _A = 25 °C | I _S | 1.7 ^{b, c} | | |
| Avalanche current | L = 0 1 mH | I _{AS} | 11 | | |
| Single-pulse avalanche energy | | E _{AS} | 6.1 | mJ | |
| Maximum power dissipation | T _C = 25 °C | | 3.1 | | |
| | T _C = 70 °C | | 2 | w | |
| | T _A = 25 °C | P _D | 2 ^{b, c} | vv | |
| | T _A = 70 °C | 1 | 1.3 ^{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 ^{a, d} | | R _{thJA} | 55 | 62.5 | °C/W | |
| Maximum junction-to-foot (drain) | Steady state | R _{thJF} | 33 | 40 | C/W | |

Notes

a. Based on $T_C = 25 \ ^{\circ}C$

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

t = 10 s c.

d. Maximum under steady state conditions is 110 °C/W

S09-0321-Rev. A, 02-Mar-09

1

Document Number: 64737

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| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT | |
|---|-------------------------|--|------|-------|-------|------------|--|
| Static | <u> </u> | | | | | | |
| Drain-source breakdown voltage | V _{DS} | $V_{GS} = 0 \text{ V}, \text{ I}_{D} = 250 \mu\text{A}$ | 60 | - | - | V | |
| V _{DS} temperature coefficient | $\Delta V_{DS}/T_{J}$ | L 050 A | - | 55 | - | mV/°C | |
| V _{GS(th)} temperature coefficient | $\Delta V_{GS(th)}/T_J$ | I _D = 250 μA | - | -6 | - | | |
| | | $V_{DS} = V_{GS}, I_D = 250 \ \mu A$ | 1 | - | 3 | v | |
| Gate-source threshold voltage | V _{GS(th)} | $V_{DS} = V_{GS}, I_D = 5 \text{ mA}$ | - | 2.5 | - | | |
| Gate-source leakage | I _{GSS} | $V_{DS} = 0 V, V_{GS} = 20 V$ | - | - | 100 | nA | |
| Zara gata valtaga drain aurrant | | $V_{DS} = 60 \text{ V}, \text{ V}_{GS} = 0 \text{ V}$ | - | - | 1 | 1 10 μΑ | |
| Zero gate voltage drain current | IDSS | $V_{DS} = 60 \text{ V}, \text{ V}_{GS} = 0 \text{ V}, \text{ T}_{J} = 85 ^{\circ}\text{C}$ | - | - | 10 | | |
| On-state drain current ^a | I _{D(on)} | $V_{DS} \ge 5 \text{ V}, V_{GS} = 10 \text{ V}$ | 20 | - | - | Α | |
| | D | $V_{GS} = 10 \text{ V}, \text{ I}_{D} = 4.3 \text{ A}$ | - | 0.046 | 0.058 | Ω | |
| Drain-source on-state resistance ^a | R _{DS(on)} | $V_{GS} = 4.5 \text{ V}, \text{ I}_{D} = 3.9 \text{ A}$ | - | 0.059 | 0.072 | | |
| Forward transconductance ^a | g _{fs} | $V_{DS} = 15 \text{ V}, \text{ I}_{D} = 4.3 \text{ A}$ | - | 15 | - | S | |
| Dynamic ^b | | | | | | | |
| Input capacitance | C _{iss} | | - | 665 | - | pF | |
| Output capacitance | Coss | $V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$ | - | 75 | - | | |
| Reverse transfer capacitance | C _{rss} | | - | 40 | - | | |
| - | | $V_{DS} = 30 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 4.3 \text{ A}$ | - | 13 | 20 | - | |
| Total gate charge | Qg | | - | 6 | 9 | nC | |
| Gate-source charge | Q _{gs} | V_{DS} = 30 V, V_{GS} = 4.5 V, I_D = 4.3 A | - | 2.3 | - | | |
| Gate-drain charge | Q _{gd} | | - | 2.6 | - | | |
| Gate resistance | Rg | f = 1 MHz | - | 2 | - | Ω | |
| Turn-on delay time | t _{d(on)} | | - | 15 | 25 | | |
| Rise time | tr | $V_{DD} = 30 \text{ V}, \text{ R}_{\text{I}} = 8.8 \Omega,$ | - | 65 | 100 | | |
| Turn-off delay time | t _{d(off)} | $I_D \cong 3.4$ Å, $V_{GEN} = 4.5$ V, $R_g = 1$ Ω | - | 15 | 25 | | |
| Fall time | t _f | | - | 10 | 15 | | |
| Turn-on delay time | t _{d(on)} | | - | 10 | 15 | ns | |
| Rise time | tr | $V_{DD} = 30 \text{ V}, \text{ R}_{L} = 8.8 \Omega,$ | - | 15 | 25 | 1 | |
| Turn-off delay time | t _{d(off)} | $I_D \cong 3.4 \text{ A}, V_{GEN} = 10 \text{ V}, \text{ R}_g = 1 \Omega$ | - | 20 | 30 | - | |
| Fall time | t _f | | - | 10 | 15 | 1 | |
| Drain-Source Body Diode Characteris | tics | | | • | | | |
| Continuous source-drain diode current | I _S | T _C = 25 °C | - | - | 2.6 | | |
| Pulse diode forward current | I _{SM} | - | - | - | 20 | A | |
| Body diode voltage | V _{SD} | I _S = 1.7 A, V _{GS} = 0 V | - | 0.8 | 1.2 | V | |
| Body diode reverse recovery time | t _{rr} | | - | 30 | 60 | ns | |
| Body diode reverse recovery charge | Q _{rr} | I _F = 1.7 A, di/dt = 100 A/μs, | - | 32 | 50 | nC | |
| Reverse recovery fall time | ta | $T_{\rm J} = 25 \ ^{\circ}{\rm C}$ | - | 25 | - | 1 | |
| Reverse recovery rise time | t _b | | - | 5 | - | ns | |

Notes

a. Pulse test; pulse width \leq 300 µs, duty cycle \leq 2 %

b. Guaranteed by design, not subject to production testing

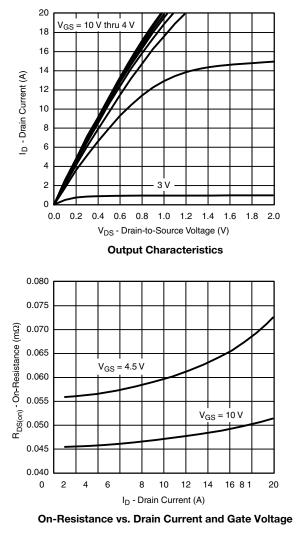
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

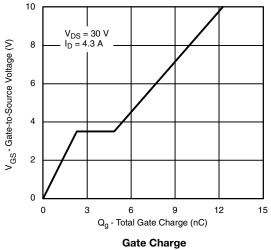
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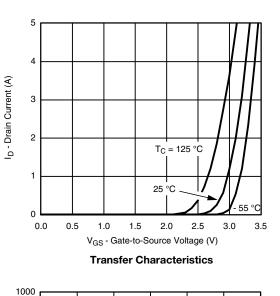


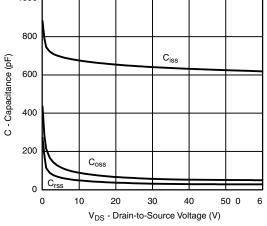
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TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

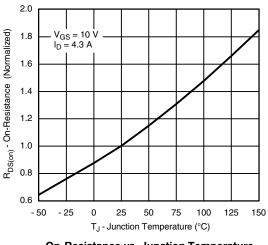








Capacitance



On-Resistance vs. Junction Temperature

S09-0321-Rev. A, 02-Mar-09

3

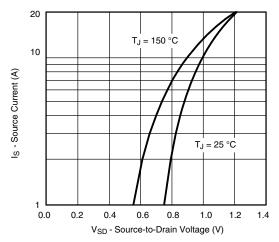
Document Number: 64737



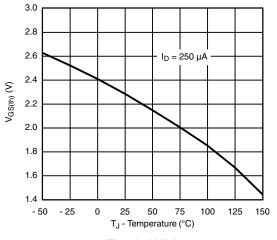
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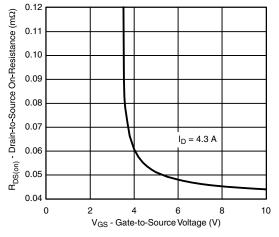
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



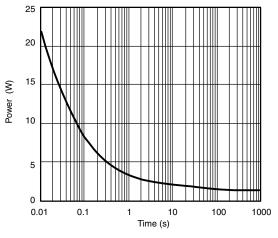
Source-Drain Diode Forward Voltage



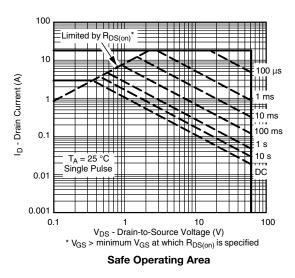




On-Resistance vs. Gate-to-Source Voltage



Single Pulse Power, Junction-to-Ambient



4

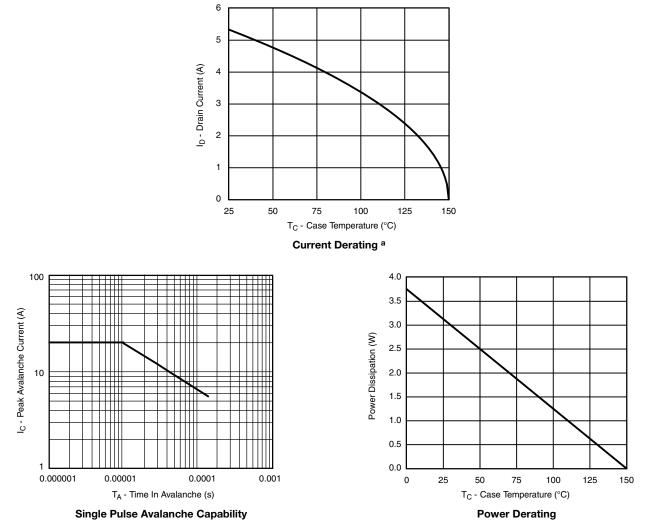
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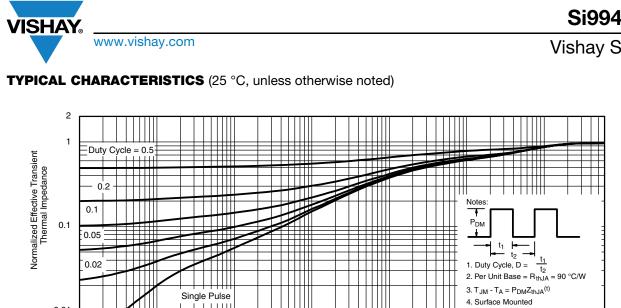
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TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Note

a. 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



10-1

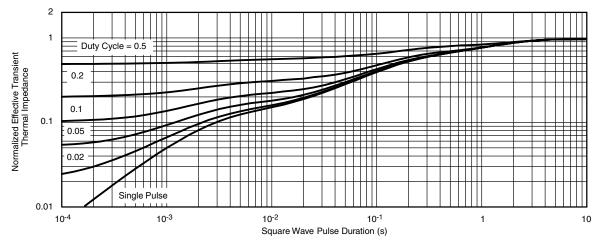


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10

100

600



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?64737.

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10⁻²

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Package Information

Vishay Siliconix

SOIC (NARROW): 8-LEAD JEDEC Part Number: MS-012





| | MILLIMETERS | | INC | HES | |
|---|-------------|------|-----------|-------|--|
| DIM | Min | Мах | Min | Max | |
| A | 1.35 | 1.75 | 0.053 | 0.069 | |
| A ₁ | 0.10 | 0.20 | 0.004 | 0.008 | |
| В | 0.35 | 0.51 | 0.014 | 0.020 | |
| С | 0.19 | 0.25 | 0.0075 | 0.010 | |
| D | 4.80 | 5.00 | 0.189 | 0.196 | |
| E | 3.80 | 4.00 | 0.150 | 0.157 | |
| е | 1.27 | BSC | 0.050 BSC | | |
| н | 5.80 | 6.20 | 0.228 | 0.244 | |
| h | 0.25 | 0.50 | 0.010 | 0.020 | |
| L | 0.50 | 0.93 | 0.020 | 0.037 | |
| q | 0° | 8° | 0° | 8° | |
| S | 0.44 | 0.64 | 0.018 | 0.026 | |
| ECN: C-06527-Rev. I, 11-Sep-06 DWG: 5498 | | | | | |

Application Note 826

Vishay Siliconix



RECOMMENDED MINIMUM PADS FOR SO-8



Recommended Minimum Pads Dimensions in Inches/(mm)

Return to Index



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