

Features

- N-Channel MOSFET and NPN Transistor in One Package
- Low On-Resistance
- Very Low Gate Threshold Voltage, 1.0V max
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Ultra-Small Surface Mount Package
- **Lead, Halogen and Antimony Free, RoHS Compliant (Note 2)**
- **ESD Protected MOSFET Gate up to 2kV**
- **"Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

- Case: SOT-363
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish - Matte Tin annealed over Alloy 42 Lead frame. Solderable per MIL-STD-202, Method 208
- Marking Information: See Page 5
- Ordering Information: See Page 5
- Weight: 0.006 grams (approximate)



Maximum Ratings – MOSFET, Q1 @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic | Symbol | Value | Units |
|-------------------------------|-----------|----------|-------|
| Drain-Source Voltage | V_{DSS} | 50 | V |
| Gate-Source Voltage | V_{GSS} | ± 12 | V |
| Drain Current (Note 1) | I_D | 160 | mA |
| Pulsed Drain Current (Note 1) | I_{DM} | 560 | mA |

Maximum Ratings - NPN Transistor, Q2 @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic | Symbol | Value | Unit |
|---------------------------|-----------|-------|------|
| Collector-Base Voltage | V_{CBO} | 50 | V |
| Collector-Emitter Voltage | V_{CEO} | 45 | V |
| Emitter-Base Voltage | V_{EBO} | 6.0 | V |
| Collector Current | I_C | 100 | mA |

Thermal Characteristics, Total Device @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic | Symbol | Value | Unit |
|--|-----------------|-------------|---------------------------|
| Total Power Dissipation (Note 1) | P_D | 250 | mW |
| Thermal Resistance, Junction to Ambient (Note 1) | $R_{\theta JA}$ | 500 | $^\circ\text{C}/\text{W}$ |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55 to +150 | $^\circ\text{C}$ |

- Notes:
1. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.
 2. No purposefully added lead. Halogen and Antimony Free.
 3. Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com/products/lead_free/index.php.

Electrical Characteristics - MOSFET @T_A = 25°C unless otherwise specified

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|-------------------------------------|---------------------|-----|-----|------------|------|---|
| OFF CHARACTERISTICS (Note 2) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | 50 | — | — | V | V _{GS} = 0V, I _D = 250μA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | 10 | μA | V _{DS} = 50V, V _{GS} = 0V |
| Gate-Body Leakage | I _{GSS} | — | — | 1.0 5.0 | μA | V _{GS} = ±8V, V _{DS} = 0V V _{GS} = ±12V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 2) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | 0.7 | 0.8 | 1.0 | V | V _{DS} = V _{GS} , I _D = 250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 3.1 | 4 | Ω | V _{GS} = 4V, I _D = 100mA |
| | | — | 4 | 5 | | V _{GS} = 2.5V, I _D = 80mA |
| Forward Transconductance | g _{FS} | 180 | — | — | mS | V _{DS} = 10V, I _D = 100mA, f = 1.0KHz |
| DYNAMIC CHARACTERISTICS | | | | | | |
| Input Capacitance | C _{iss} | — | 25 | — | pF | V _{DS} = 10V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oss} | — | 5 | — | pF | |
| Reverse Transfer Capacitance | C _{rss} | — | 2.1 | — | pF | |

Electrical Characteristics - NPN Transistor @T_A = 25°C unless otherwise specified

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|----------------------|----------|------------|------------|----------|---|
| Collector-Base Breakdown Voltage (Note 4) | V _{(BR)CBO} | 50 | — | — | V | I _C = 10μA, I _B = 0 |
| Collector-Emitter Breakdown Voltage (Note 4) | V _{(BR)CEO} | 45 | — | — | V | I _C = 10mA, I _B = 0 |
| Emitter-Base Breakdown Voltage (Note 4) | V _{(BR)EBO} | 6 | — | — | V | I _E = 1μA, I _C = 0 |
| DC Current Gain (Note 4) | h _{FE} | 200 | 290 | 450 | — | V _{CE} = 5.0V, I _C = 2.0mA |
| Collector-Emitter Saturation Voltage (Note 4) | V _{CE(SAT)} | — | — | 100 300 | mV | I _C = 10mA, I _B = 0.5mA I _C = 100mA, I _B = 5.0mA |
| Base-Emitter Saturation Voltage (Note 4) | V _{BE(SAT)} | — | 700 900 | — | mV | I _C = 10mA, I _B = 0.5mA I _C = 100mA, I _B = 5.0mA |
| Base-Emitter Voltage (Note 4) | V _{BE} | 580 — | 660 — | 700 770 | mV | V _{CE} = 5.0V, I _C = 2.0mA V _{CE} = 5.0V, I _C = 10mA |
| Collector Cut-Off Current (Note 4) | I _{CBO} | — | — | 15 5.0 | nA μA | V _{CB} = 30V V _{CB} = 30V, T _A = 150°C |
| Collector-Emitter Cut-Off Current (Note 4) | I _{CES} | — | — | 100 | nA | V _{CE} = 45V |
| Gain Bandwidth Product | f _T | 100 | — | — | MHz | V _{CE} = 5.0V, I _C = 10mA, f = 100MHz |
| Output Capacitance | C _{OBO} | — | — | 4.5 | pF | V _{CB} = 10V, f = 1.0MHz |
| Noise Figure | NF | — | — | 10 | dB | V _{CE} = 5V, R _S = 2.0kΩ, f = 1.0kHz, BW = 200Hz |

Notes: 4. Short duration pulse test used to minimize self-heating effect.

MOSFET

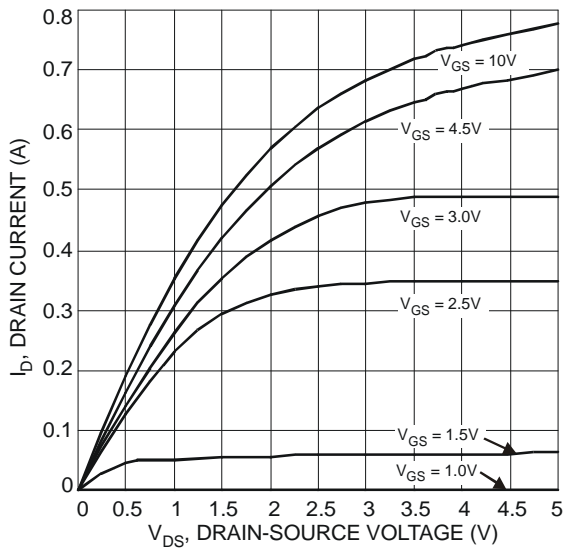


Fig. 1 Typical Output Characteristics

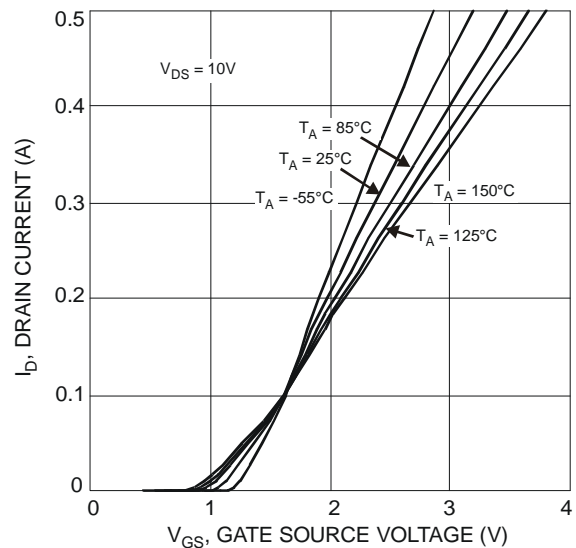


Fig. 2 Typical Transfer Characteristics

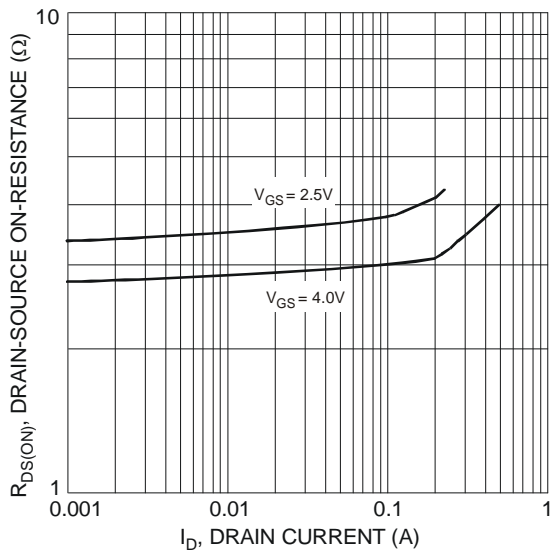


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

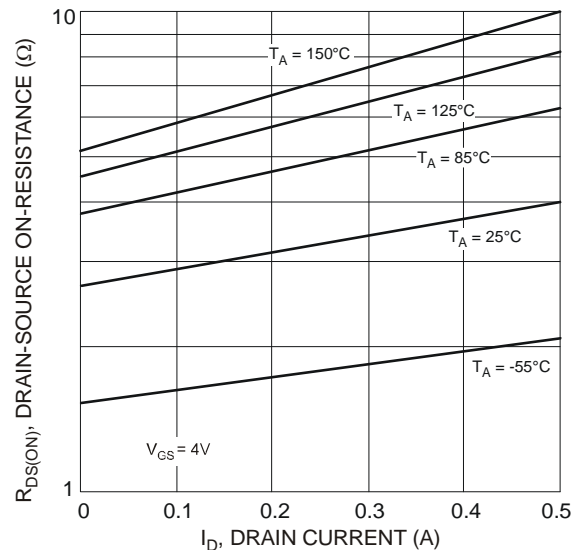


Fig. 4 Typical Drain-Source On-Resistance vs. Drain Current and Temperature

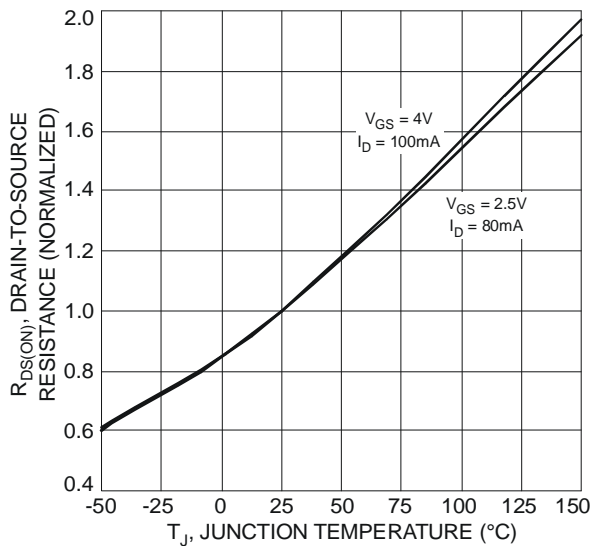


Fig. 5 On-Resistance Variation with Temperature

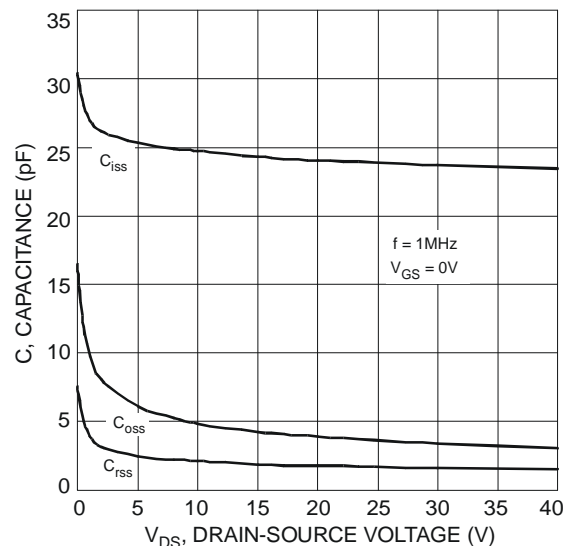


Fig. 6 Typical Capacitance

MOSFET (continued)

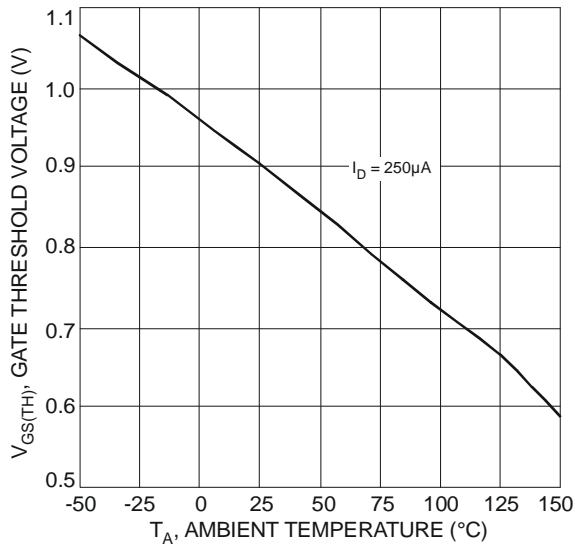


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

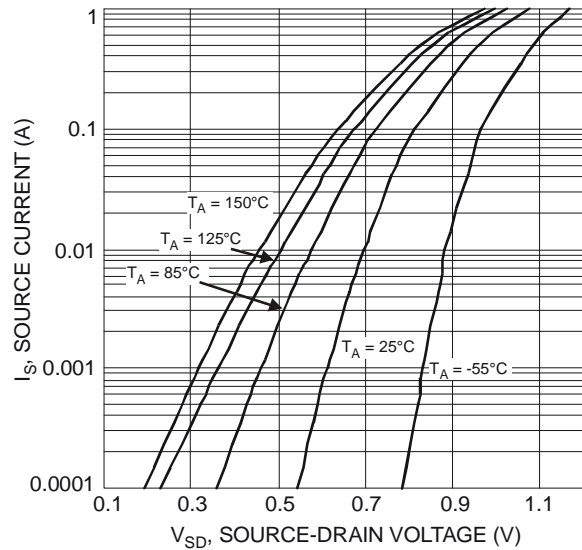


Fig. 8 Diode Forward Voltage vs. Current

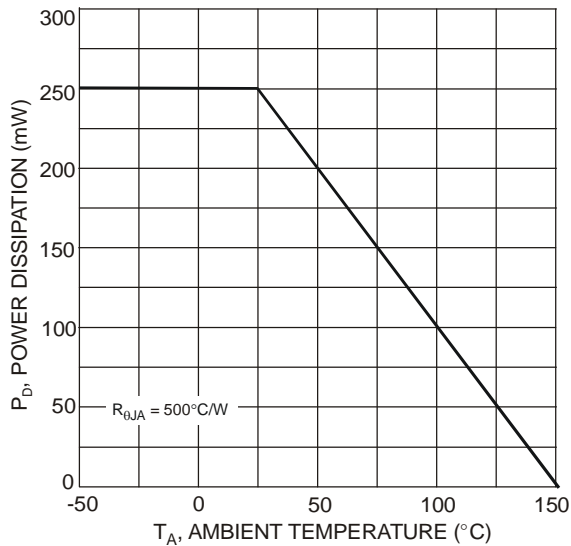


Fig. 9 Derating Curve - Total Package Power Dissipation

NPN Transistor

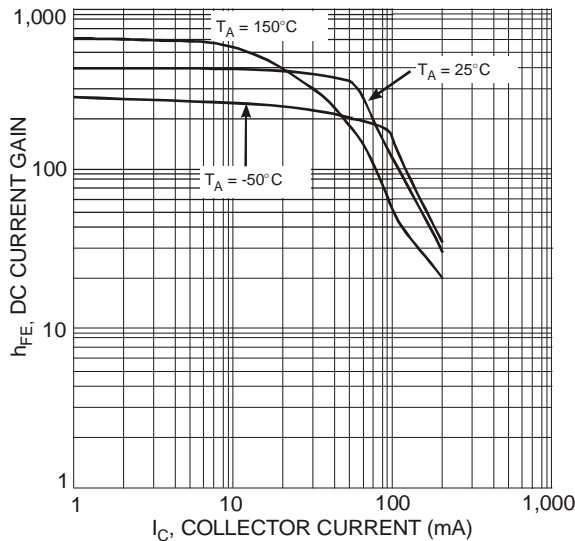


Fig. 10 Typical DC Current Gain vs. Collector Current

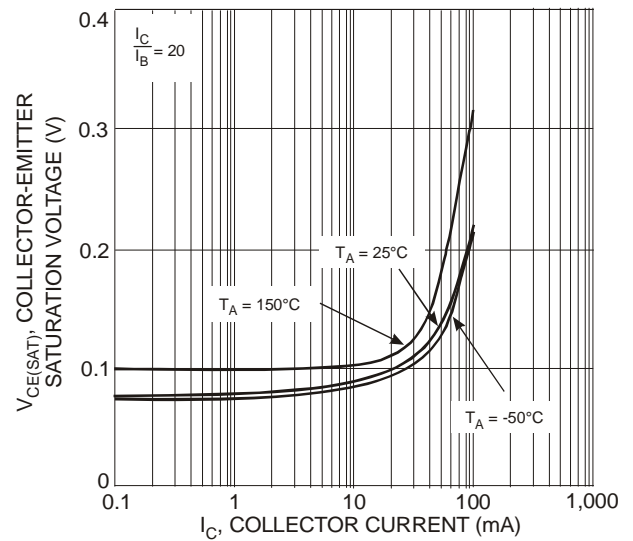


Fig. 11 Typical Collector-Emitter Saturation Voltage vs. Collector Current

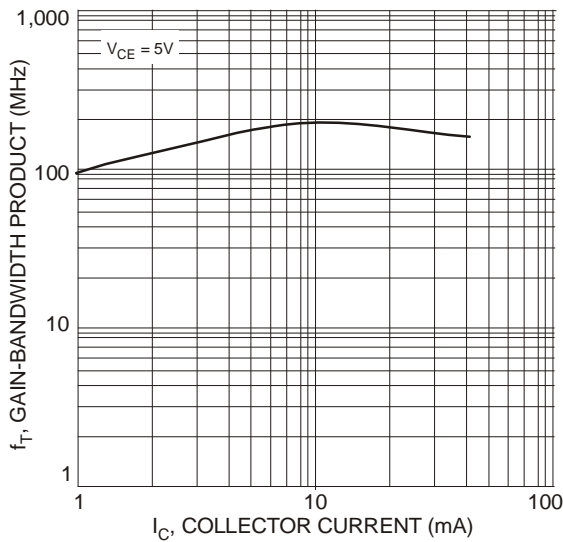


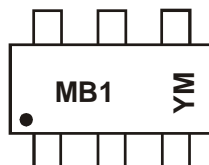
Fig. 12 Typical Gain-Bandwidth Product vs. Collector Current

Ordering Information (Note 5)

| Part Number | Case | Packaging |
|--------------|---------|------------------|
| DMB53D0UDW-7 | SOT-363 | 3000/Tape & Reel |

Notes: 5. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

Marking Information



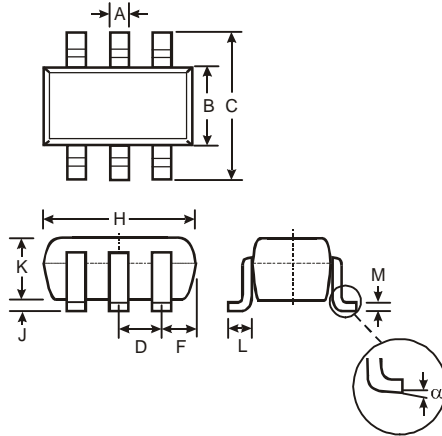
MB1 = Marking Code
YM = Date Code Marking
Y = Year (ex: V = 2008)
M = Month (ex: 9 = September)

Date Code Key

| Year | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|------|------|------|------|------|------|------|------|------|
| Code | V | W | X | Y | Z | A | B | C |

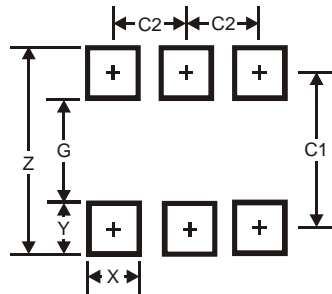
| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |

Package Outline Dimensions



| SOT-363 | | |
|----------------------|----------|------|
| Dim | Min | Max |
| A | 0.10 | 0.30 |
| B | 1.15 | 1.35 |
| C | 2.00 | 2.20 |
| D | 0.65 Typ | |
| F | 0.40 | 0.45 |
| H | 1.80 | 2.20 |
| J | 0 | 0.10 |
| K | 0.90 | 1.00 |
| L | 0.25 | 0.40 |
| M | 0.10 | 0.22 |
| α | 0° | 8° |
| All Dimensions in mm | | |

Suggested Pad Layout



| Dimensions | Value (in mm) |
|------------|---------------|
| Z | 2.5 |
| G | 1.3 |
| X | 0.42 |
| Y | 0.6 |
| C1 | 1.9 |
| C2 | 0.65 |

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