

## DMTH10H010SCT-VB Datasheet

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

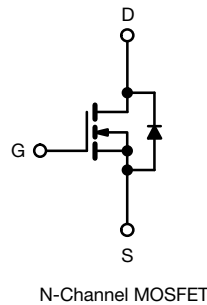
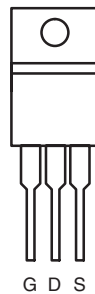
| PRODUCT SUMMARY                               |        |
|-----------------------------------------------|--------|
| $V_{DS}$ (V)                                  | 100    |
| $R_{DS(on)}$ ( $\Omega$ ) at $V_{GS} = 10$ V  | 0.009  |
| $R_{DS(on)}$ ( $\Omega$ ) at $V_{GS} = 4.5$ V | 0.020  |
| $I_D$ (A)                                     | 100    |
| Configuration                                 | Single |

#### FEATURES

- Trench Power MOSFET
- 175 °C Maximum Junction Temperature
- Compliant to RoHS Directive 2002/95/EC



TO-220AB



| ABSOLUTE MAXIMUM RATINGS T <sub>A</sub> = 25 °C, unless otherwise noted |                                              |                                   |                  |      |
|-------------------------------------------------------------------------|----------------------------------------------|-----------------------------------|------------------|------|
| Parameter                                                               |                                              | Symbol                            | Limit            | Unit |
| Drain-Source Voltage                                                    |                                              | V <sub>DS</sub>                   | 100              | V    |
| Gate-Source Voltage                                                     |                                              | V <sub>GS</sub>                   | ± 20             |      |
| Continuous Drain Current (T <sub>J</sub> = 150 °C)                      | T <sub>C</sub> = 25 °C                       | I <sub>D</sub>                    | 100              | A    |
|                                                                         | T <sub>C</sub> = 125 °C                      |                                   | 75 <sup>a</sup>  |      |
| Pulsed Drain Current                                                    |                                              | I <sub>DM</sub>                   | 300              |      |
| Avalanche Current                                                       | L = 0.1 mH                                   | I <sub>AS</sub>                   | 75               |      |
| Single Pulse Avalanche Energy <sup>b</sup>                              |                                              | E <sub>AS</sub>                   | 280              |      |
| Maximum Power Dissipation <sup>b</sup>                                  | T <sub>C</sub> = 25 °C (TO-220AB and TO-263) | P <sub>D</sub>                    | 250 <sup>c</sup> | W    |
|                                                                         | T <sub>A</sub> = 25 °C (TO-263) <sup>d</sup> |                                   | 3.75             |      |
| Operating Junction and Storage Temperature Range                        |                                              | T <sub>J</sub> , T <sub>stg</sub> | - 55 to 175      | °C   |

| THERMAL RESISTANCE RATINGS |            |       |      |  |
|----------------------------|------------|-------|------|--|
| Parameter                  | Symbol     | Limit | Unit |  |
| Junction-to-Ambient        | $R_{thJA}$ | 40    | °C/W |  |
|                            |            | 62.5  |      |  |
| Junction-to-Case           | $R_{thJC}$ | 0.6   |      |  |

Notes:

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

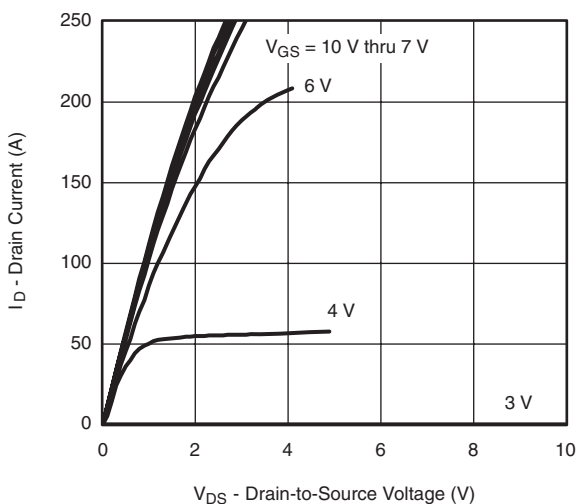
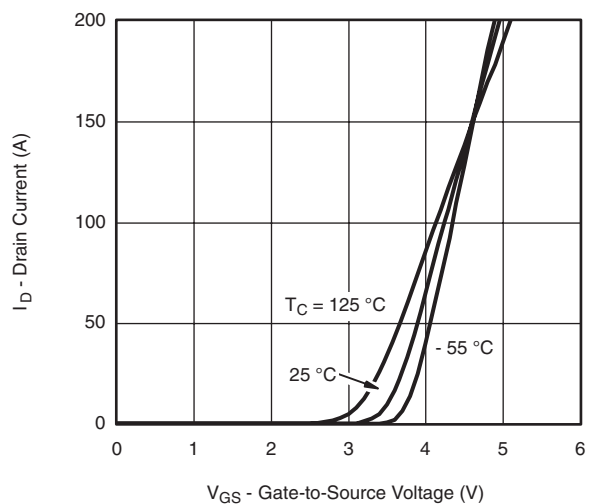
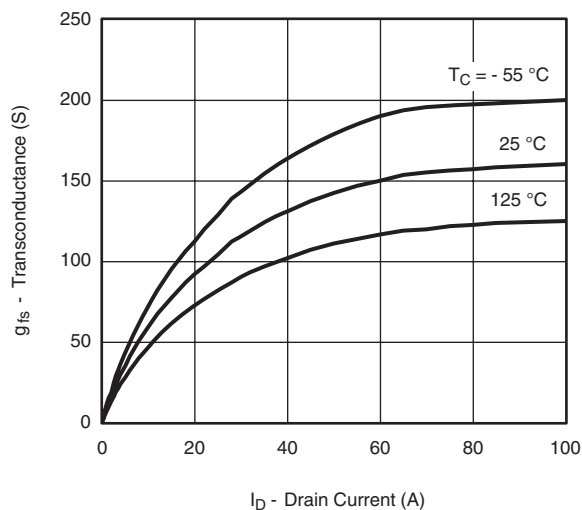
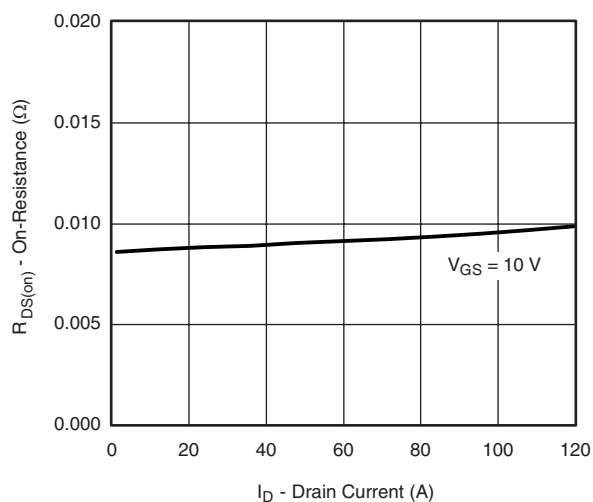
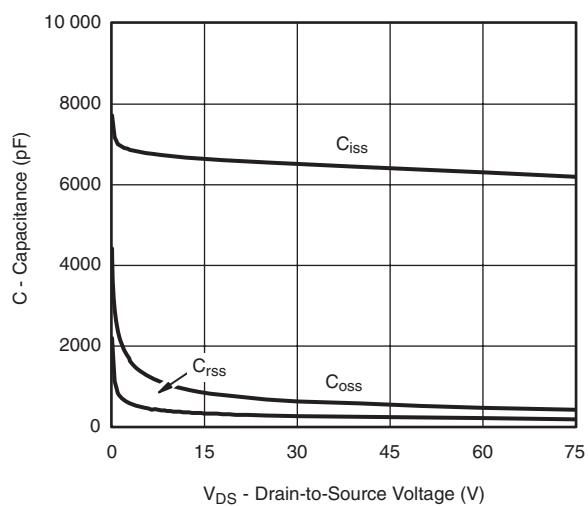
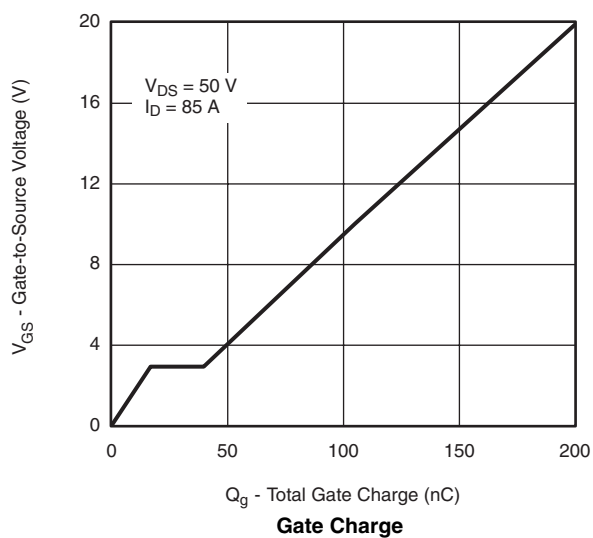
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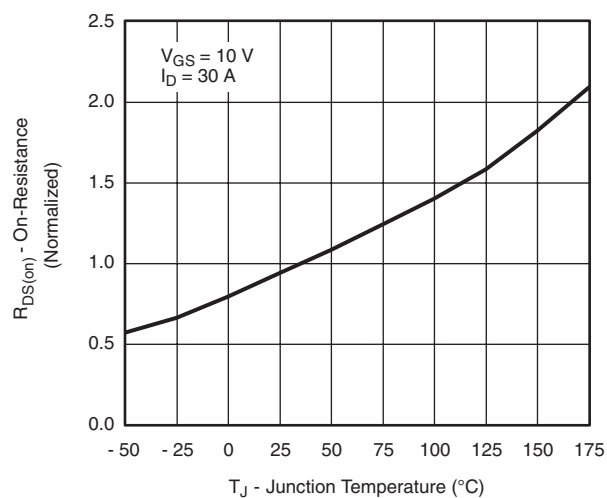
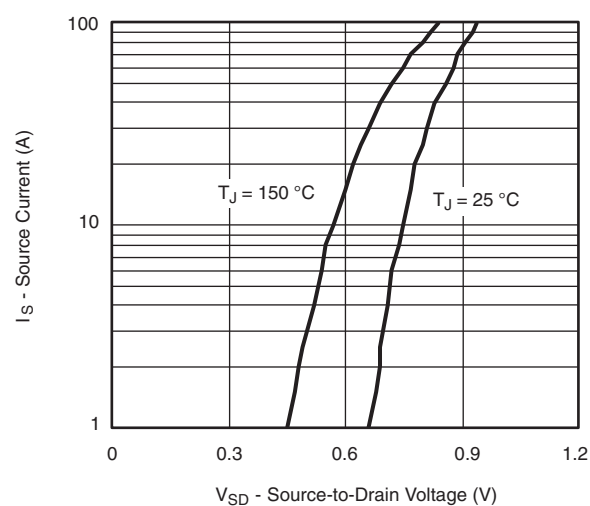
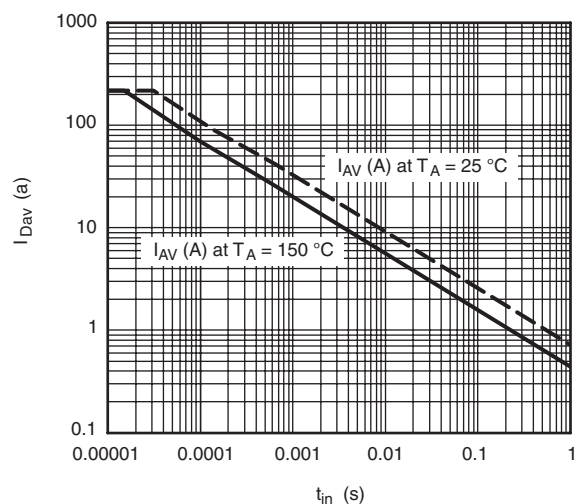
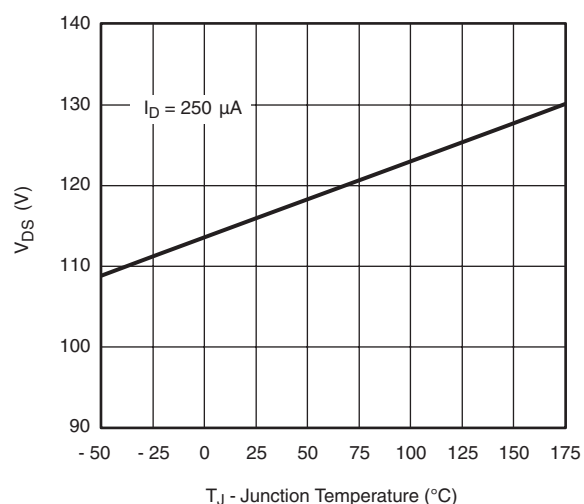
| SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted                     |               |                                                                                                                            |      |       |           |               |
|------------------------------------------------------------------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------|------|-------|-----------|---------------|
| Parameter                                                                                      | Symbol        | Test Conditions                                                                                                            | Min. | Typ.  | Max.      | Unit          |
| Static                                                                                         |               |                                                                                                                            |      |       |           |               |
| Drain-Source Breakdown Voltage                                                                 | $V_{DS}$      | $V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$                                                                        | 100  |       |           | V             |
| Gate-Threshold Voltage                                                                         | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$                                                                            | 2    |       | 4         |               |
| Gate-Body Leakage                                                                              | $I_{GSS}$     | $V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$                                                                            |      |       | $\pm 100$ | nA            |
| Zero Gate Voltage Drain Current                                                                | $I_{DSS}$     | $V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$                                                                               |      |       | 1         | $\mu\text{A}$ |
|                                                                                                |               | $V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^{\circ}\text{C}$                                            |      |       | 50        |               |
|                                                                                                |               | $V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^{\circ}\text{C}$                                            |      |       | 250       |               |
| On-State Drain Current <sup>a</sup>                                                            | $I_{D(on)}$   | $V_{DS} = \geq 5\text{ V}, V_{GS} = 10\text{ V}$                                                                           | 120  |       |           | A             |
| Drain-Source On-State Resistance <sup>a</sup>                                                  | $R_{DS(on)}$  | $V_{GS} = 10\text{ V}, I_D = 30\text{ A}$                                                                                  |      | 0.009 |           | $\Omega$      |
|                                                                                                |               | $V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$                                                                                 |      | 0.020 |           |               |
|                                                                                                |               | $V_{GS} = 10\text{ V}, I_D = 30\text{ A}, T_J = 125\text{ }^{\circ}\text{C}$                                               |      | 0.023 |           |               |
|                                                                                                |               | $V_{GS} = 10\text{ V}, I_D = 30\text{ A}, T_J = 175\text{ }^{\circ}\text{C}$                                               |      | 0.030 |           |               |
| Forward Transconductance <sup>a</sup>                                                          | $g_{fs}$      | $V_{DS} = 15\text{ V}, I_D = 30\text{ A}$                                                                                  | 25   |       |           | S             |
| Dynamic <sup>b</sup>                                                                           |               |                                                                                                                            |      |       |           |               |
| Input Capacitance                                                                              | $C_{iss}$     | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                                              |      | 4700  |           | pF            |
| Output Capacitance                                                                             | $C_{oss}$     |                                                                                                                            |      | 665   |           |               |
| Reverse Transfer Capacitance                                                                   | $C_{rss}$     |                                                                                                                            |      | 265   |           |               |
| Total Gate Charge <sup>c</sup>                                                                 | $Q_g$         | $V_{DS} = 50\text{ V}, V_{GS} = 10\text{ V}, I_D = 85\text{ A}$                                                            |      | 105   | 160       | nC            |
| Gate-Source Charge <sup>c</sup>                                                                | $Q_{gs}$      |                                                                                                                            |      | 17    |           |               |
| Gate-Drain Charge <sup>c</sup>                                                                 | $Q_{gd}$      |                                                                                                                            |      | 23    |           |               |
| Turn-On Delay Time <sup>c</sup>                                                                | $t_{d(on)}$   | $V_{DD} = 50\text{ V}, R_L = 0.6\text{ }\Omega$<br>$I_D \cong 85\text{ A}, V_{GEN} = 10\text{ V}, R_g = 2.5\text{ }\Omega$ |      | 12    | 25        | ns            |
| Rise Time <sup>c</sup>                                                                         | $t_r$         |                                                                                                                            |      | 90    | 135       |               |
| Turn-Off DelayTime <sup>c</sup>                                                                | $t_{d(off)}$  |                                                                                                                            |      | 55    | 85        |               |
| Fall Time <sup>c</sup>                                                                         | $t_f$         |                                                                                                                            |      | 130   | 195       |               |
| Source-Drain Diode Ratings and Characteristics $T_C = 25\text{ }^{\circ}\text{C}$ <sup>b</sup> |               |                                                                                                                            |      |       |           |               |
| Continuous Current                                                                             | $I_S$         |                                                                                                                            |      |       | 85        | A             |
| Pulsed Current                                                                                 | $I_{SM}$      |                                                                                                                            |      |       | 240       |               |
| Forward Voltage <sup>a</sup>                                                                   | $V_{SD}$      | $I_F = 85\text{ A}, V_{GS} = 0\text{ V}$                                                                                   |      | 1.0   | 1.5       | V             |
| Reverse Recovery Time                                                                          | $t_{rr}$      | $I_F = 50\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}$                                                                      |      | 85    | 140       | ns            |
| Peak Reverse Recovery Current                                                                  | $I_{RM(REC)}$ |                                                                                                                            |      | 4.5   | 7         | A             |
| Reverse Recovery Charge                                                                        | $Q_{rr}$      |                                                                                                                            |      | 0.17  | 0.35      | $\mu\text{C}$ |

Notes:

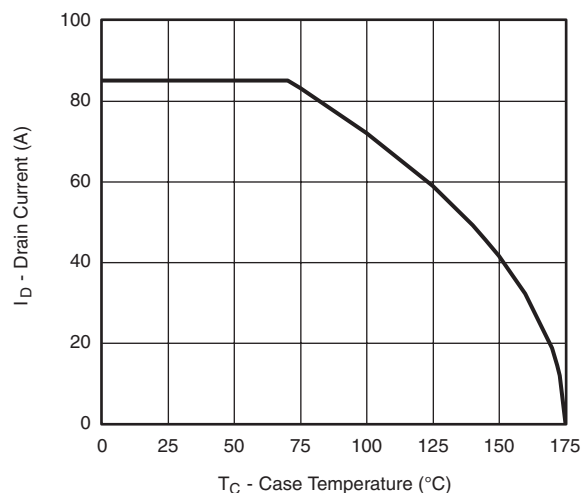
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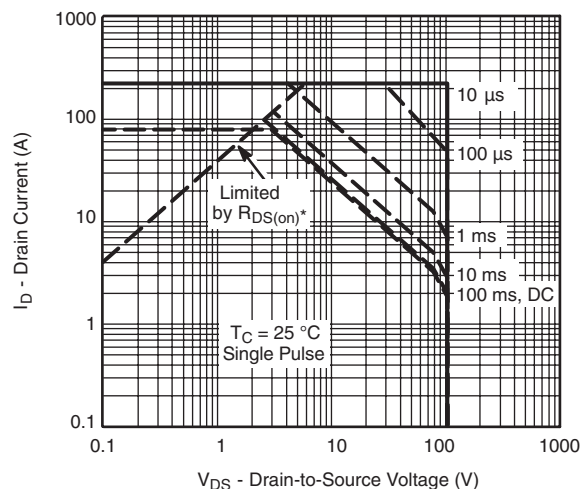
**TYPICAL CHARACTERISTICS**  $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted
**Output Characteristics****Transfer Characteristics****Transconductance****On-Resistance vs. Drain Current****Capacitance**

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

**On-Resistance vs. Junction Temperature**

**Source-Drain Diode Forward Voltage**

**Avalanche Current vs. Time**

 **$T_J$  - Drain-Source Breakdown vs. Junction-Temperature**

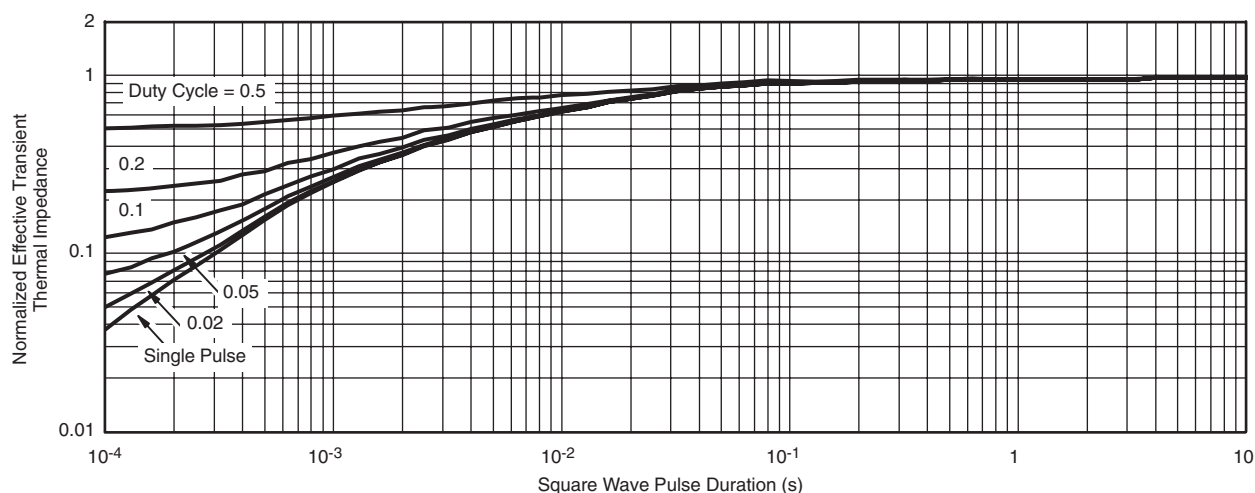
## THERMAL RATINGS



**Maximum Avalanche and Drain Current  
vs. Case Temperature**

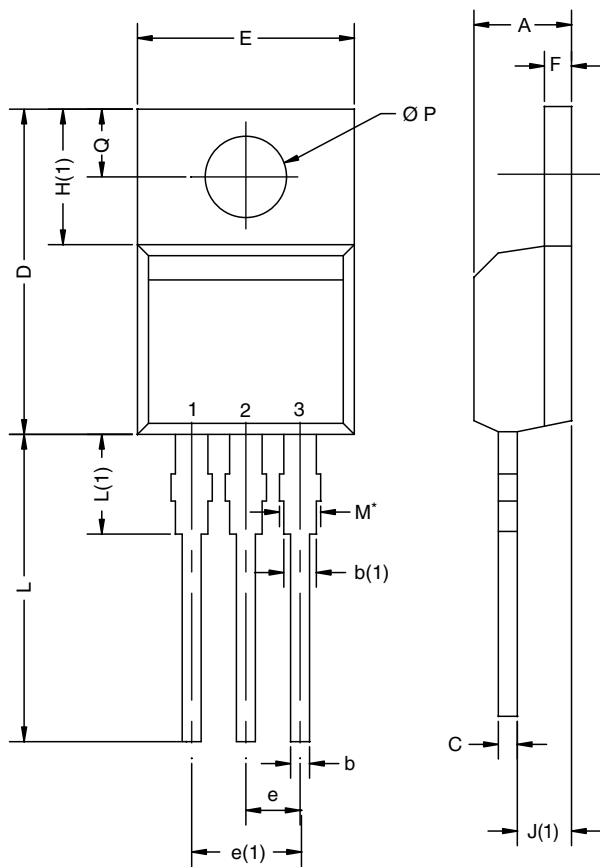


**Safe Operating Area**  
 $* V_{GS} > \text{minimum } V_{GS} \text{ at which } R_{DS(on)} \text{ is specified}$



**Normalized Thermal Transient Impedance, Junction-to-Case**

## TO-220AB



| DIM. | MILLIMETERS |       | INCHES |       |
|------|-------------|-------|--------|-------|
|      | MIN.        | MAX.  | MIN.   | MAX.  |
| A    | 4.25        | 4.65  | 0.167  | 0.183 |
| b    | 0.69        | 1.01  | 0.027  | 0.040 |
| b(1) | 1.20        | 1.73  | 0.047  | 0.068 |
| c    | 0.36        | 0.61  | 0.014  | 0.024 |
| D    | 14.85       | 15.49 | 0.585  | 0.610 |
| D2   | 12.19       | 12.70 | 0.480  | 0.500 |
| E    | 10.04       | 10.51 | 0.395  | 0.414 |
| e    | 2.41        | 2.67  | 0.095  | 0.105 |
| e(1) | 4.88        | 5.28  | 0.192  | 0.208 |
| F    | 1.14        | 1.40  | 0.045  | 0.055 |
| H(1) | 6.09        | 6.48  | 0.240  | 0.255 |
| J(1) | 2.41        | 2.92  | 0.095  | 0.115 |
| L    | 13.35       | 14.02 | 0.526  | 0.552 |
| L(1) | 3.32        | 3.82  | 0.131  | 0.150 |
| Ø P  | 3.54        | 3.94  | 0.139  | 0.155 |
| Q    | 2.60        | 3.00  | 0.102  | 0.118 |

ECN: T14-0413-Rev. P, 16-Jun-14  
DWG: 5471

**Note**

\* M = 1.32 mm to 1.62 mm (dimension including protrusion)  
Heatsink hole for HVM

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