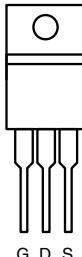


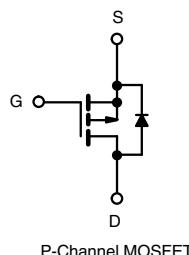
## Automotive P-Channel 30 V (D-S) 175 °C MOSFET

| <b>PRODUCT SUMMARY</b>  |        |
|---|--------|
| V <sub>DS</sub> (V)   | - 30   |
| R <sub>DS(on)</sub> ( $\Omega$ ) at V <sub>GS</sub> = - 10 V  | 0.0070 |
| R <sub>DS(on)</sub> ( $\Omega$ ) at V <sub>GS</sub> = - 4.5 V | 0.0110 |
| I <sub>D</sub> (A)  | - 50   |
| Configuration   | Single |

TO-220AB



DRAIN connected to TAB



Top View

### FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- Package with Low Thermal Resistance
- 100 % R<sub>g</sub> and UIS Tested
- AEC-Q101 Qualified<sup>d</sup>
- Compliant to RoHS Directive 2002/95/EC



### ORDERING INFORMATION

|                                 |                 |
|---------------------------------|-----------------|
| Package                         | TO-220AB        |
| Lead (Pb)-free and Halogen-free | SQP50P03-07-GE3 |

### ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub> = 25 °C, unless otherwise noted)

| PARAMETER   | SYMBOL                            | LIMIT         | UNIT |
|---|-----------------------------------|---------------|------|
| Drain-Source Voltage                                      | V <sub>DS</sub>                   | - 30          | V    |
| Gate-Source Voltage                                       | V <sub>GS</sub>                   | $\pm 20$      |      |
| Continuous Drain Current <sup>a</sup>                     | I <sub>D</sub>                    | - 50          | A    |
| T <sub>C</sub> = 125 °C                                   | I <sub>D</sub>                    | - 50          |      |
| Continuous Source Current (Diode Conduction) <sup>a</sup> | I <sub>S</sub>                    | - 50          |      |
| Pulsed Drain Current <sup>b</sup>                         | I <sub>DM</sub>                   | - 200         |      |
| Single Pulse Avalanche Current                            | I <sub>AS</sub>                   | - 50          |      |
| Single Pulse Avalanche Energy                             | E <sub>AS</sub>                   | 125           | mJ   |
| Maximum Power Dissipation <sup>b</sup>                    | P <sub>D</sub>                    | 150           | W    |
| T <sub>C</sub> = 25 °C                                    | P <sub>D</sub>                    | 50            |      |
| 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 <sub>thJA</sub> | 62    |      |
| Junction-to-Case (Drain) | R <sub>thJC</sub> | 1     | °C/W |

#### Notes

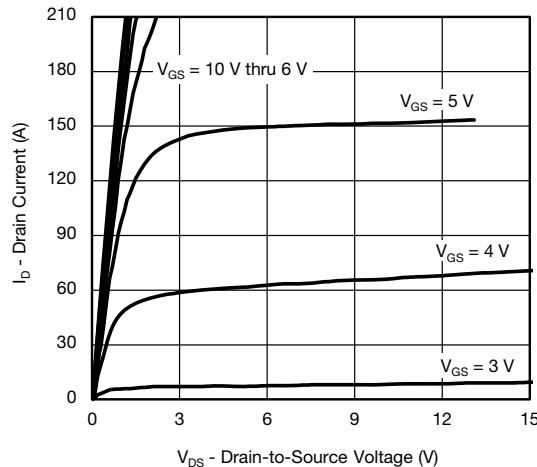
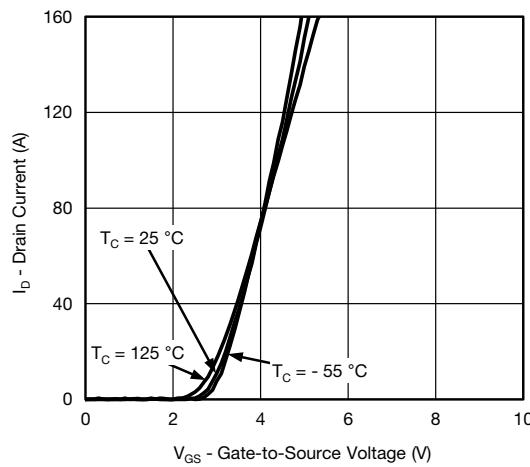
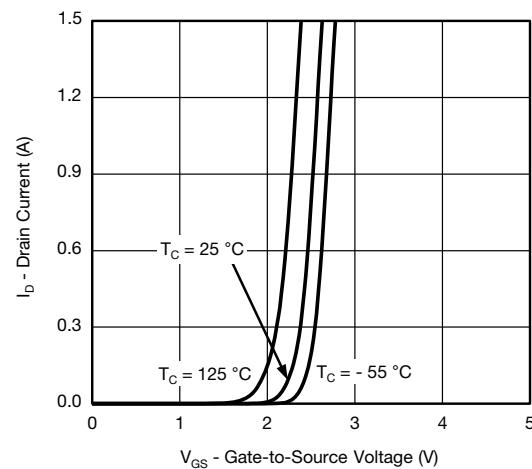
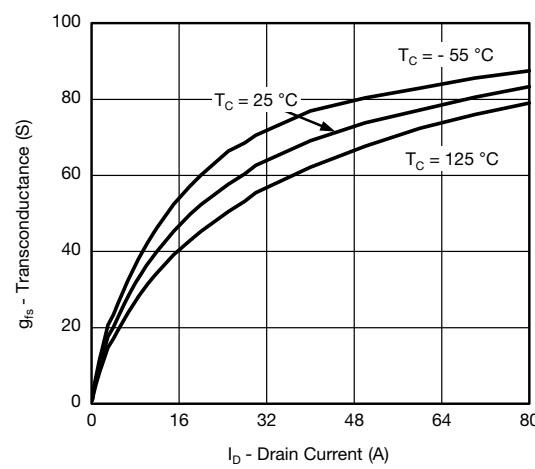
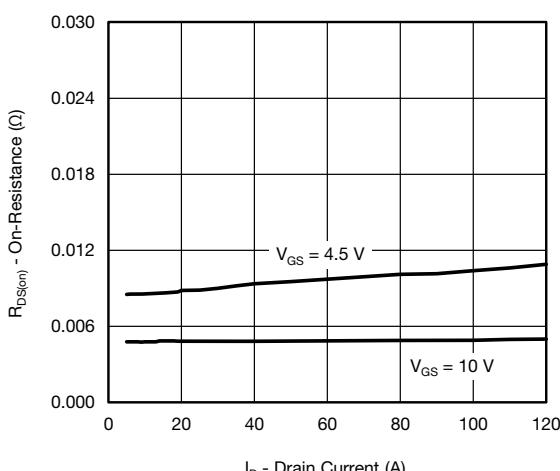
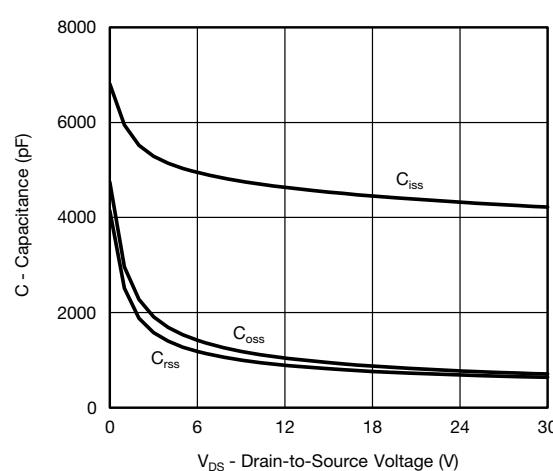
- Package limited.
- Pulse test; pulse width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2 \%$ .
- When mounted on 1" square PCB (FR-4 material).
- Parametric verification ongoing.

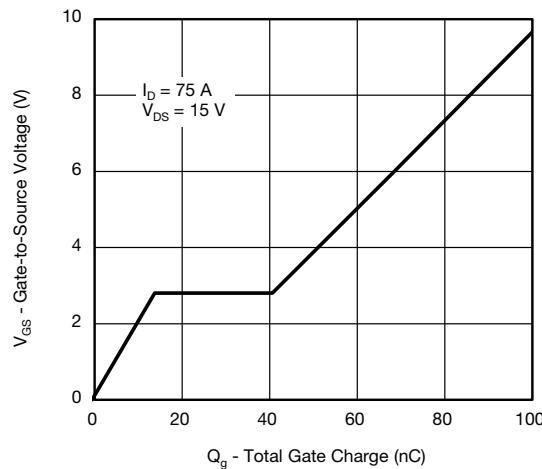
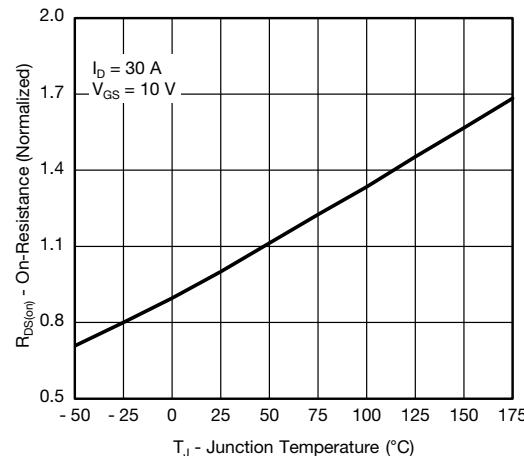
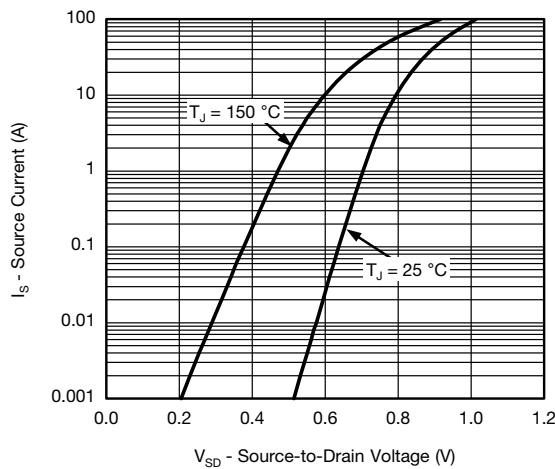
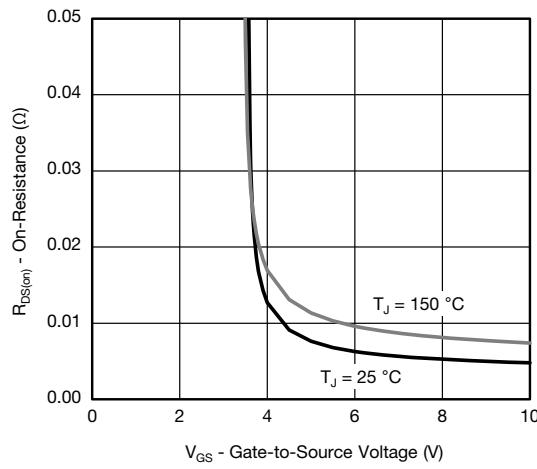
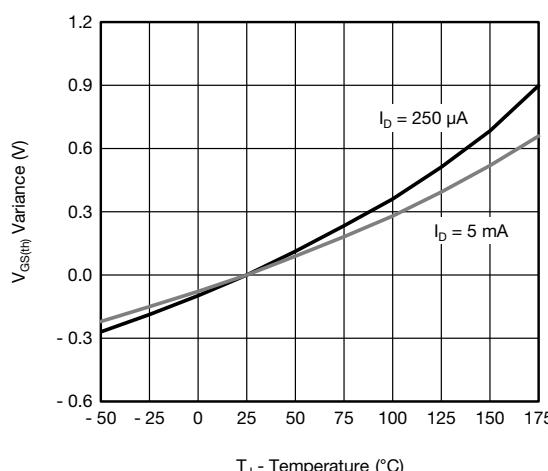
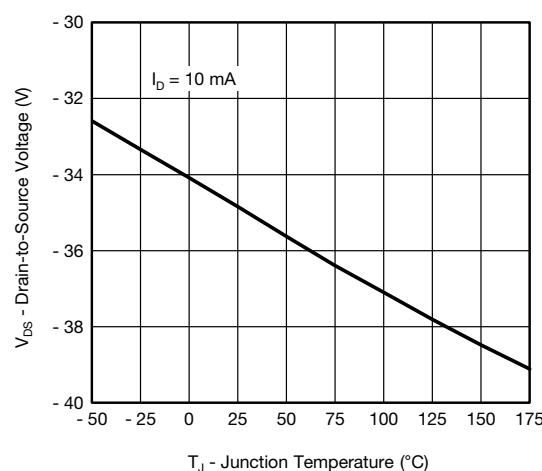
| <b>SPECIFICATIONS</b> ( $T_C = 25^\circ\text{C}$ , unless otherwise noted) |                     |   |  |       |        |           |               |  |
|--|---------------------|---|--|-------|--------|-----------|---------------|--|
| PARAMETER  | SYMBOL              | TEST CONDITIONS   |  | MIN.  | TYP.   | MAX.      | UNIT          |  |
| <b>Static</b>  |                     |   |  |       |        |           |               |  |
| Drain-Source Breakdown Voltage   | $V_{DS}$            | $V_{GS} = 0$ , $I_D = -250 \mu\text{A}$   |  | - 30  | -      | -         | V             |  |
| Gate-Source Threshold Voltage  | $V_{GS(\text{th})}$ | $V_{DS} = V_{GS}$ , $I_D = -250 \mu\text{A}$  |  | - 1.5 | - 2.0  | - 2.5     |               |  |
| Gate-Source Leakage  | $I_{GSS}$           | $V_{DS} = 0 \text{ V}$ , $V_{GS} = \pm 20 \text{ V}$  |  | -     | -      | $\pm 100$ | nA            |  |
| Zero Gate Voltage Drain Current  | $I_{DSS}$           | $V_{GS} = 0 \text{ V}$  | $V_{DS} = -30 \text{ V}$                             | -     | -      | - 1       | $\mu\text{A}$ |  |
|  |                     | $V_{GS} = 0 \text{ V}$  | $V_{DS} = -30 \text{ V}$ , $T_J = 125^\circ\text{C}$ | -     | -      | - 50      |               |  |
|  |                     | $V_{GS} = 0 \text{ V}$  | $V_{DS} = -30 \text{ V}$ , $T_J = 175^\circ\text{C}$ | -     | -      | - 250     |               |  |
| On-State Drain Current <sup>a</sup>  | $I_{D(on)}$         | $V_{GS} = -10 \text{ V}$  | $V_{DS} \leq -5 \text{ V}$                           | - 80  | -      | -         | A             |  |
| Drain-Source On-State Resistance <sup>a</sup>                              | $R_{DS(on)}$        | $V_{GS} = -10 \text{ V}$  | $I_D = -30 \text{ A}$                                | -     | 0.0050 | 0.0070    | $\Omega$      |  |
|  |                     | $V_{GS} = -10 \text{ V}$  | $I_D = -30 \text{ A}$ , $T_J = 125^\circ\text{C}$    | -     | -      | 0.0102    |               |  |
|  |                     | $V_{GS} = -10 \text{ V}$  | $I_D = -30 \text{ A}$ , $T_J = 175^\circ\text{C}$    | -     | -      | 0.0118    |               |  |
|  |                     | $V_{GS} = -4.5 \text{ V}$   | $I_D = -20 \text{ A}$                                | -     | 0.0089 | 0.0110    |               |  |
| Forward Transconductance <sup>b</sup>                                      | $g_f$               | $V_{DS} = -15 \text{ V}$ , $I_D = -30 \text{ A}$  |  | -     | 62     | -         | S             |  |
| <b>Dynamic</b>   |                     |   |  |       |        |           |               |  |
| Input Capacitance  | $C_{iss}$           | $V_{GS} = 0 \text{ V}$  | $V_{DS} = -25 \text{ V}$ , $f = 1 \text{ MHz}$       | -     | 4304   | 5380      | pF            |  |
| Output Capacitance   | $C_{oss}$           |   |  | -     | 764    | 955       |               |  |
| Reverse Transfer Capacitance   | $C_{rss}$           |   |  | -     | 680    | 850       |               |  |
| Total Gate Charge <sup>c</sup>   | $Q_g$               | $V_{GS} = -10 \text{ V}$  | $V_{DS} = -15 \text{ V}$ , $I_D = -75 \text{ A}$     | -     | 103.5  | 155       | nC            |  |
| Gate-Source Charge <sup>c</sup>  | $Q_{gs}$            |   |  | -     | 14.3   | -         |               |  |
| Gate-Drain Charge <sup>c</sup>   | $Q_{gd}$            |   |  | -     | 26.9   | -         |               |  |
| Gate Resistance  | $R_g$               | $f = 1 \text{ MHz}$   |  | 1.42  | 2.85   | 4.28      | $\Omega$      |  |
| Turn-On Delay Time <sup>c</sup>  | $t_{d(on)}$         | $V_{DD} = -15 \text{ V}$ , $R_L = 0.2 \Omega$<br>$I_D \approx -75 \text{ A}$ , $V_{GEN} = -10 \text{ V}$ , $R_g = 1 \Omega$ |  | -     | 11     | 17        | ns            |  |
| Rise Time <sup>c</sup>   | $t_r$               |   |  | -     | 10     | 15        |               |  |
| Turn-Off Delay Time <sup>c</sup>   | $t_{d(off)}$        |   |  | -     | 63     | 95        |               |  |
| Fall Time <sup>c</sup>   | $t_f$               |   |  | -     | 26     | 39        |               |  |
| <b>Source-Drain Diode Ratings and Characteristics<sup>b</sup></b>          |                     |   |  |       |        |           |               |  |
| Pulsed Current <sup>a</sup>  | $I_{SM}$            |   |  | -     | -      | - 200     | A             |  |
| Forward Voltage  | $V_{SD}$            | $I_F = -45 \text{ A}$ , $V_{GS} = 0$  |  | -     | - 0.9  | - 1.5     | V             |  |

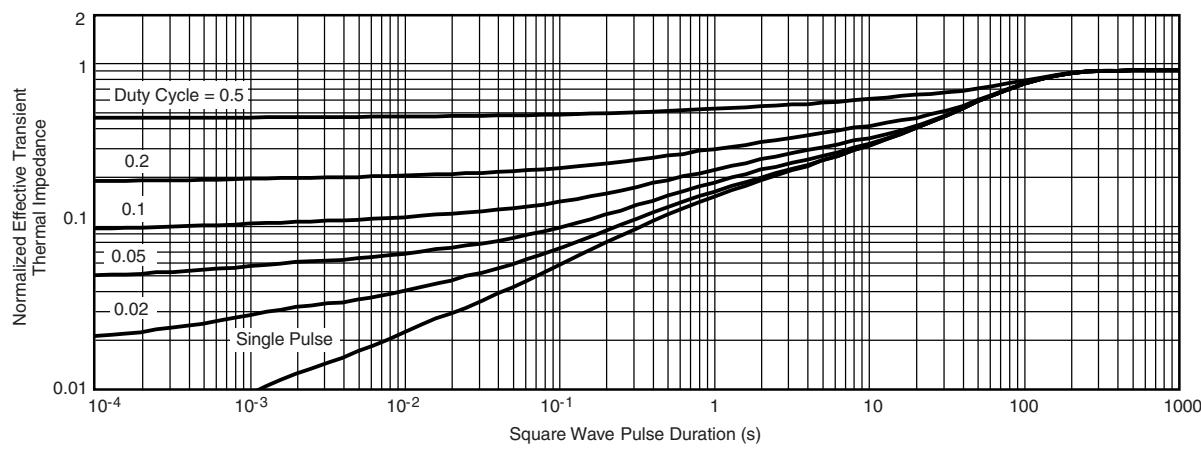
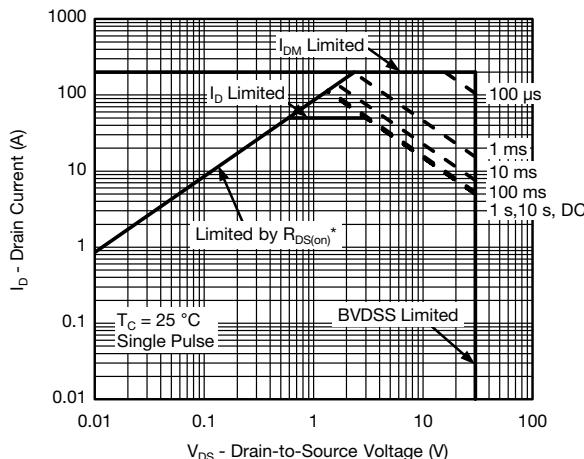
**Notes**

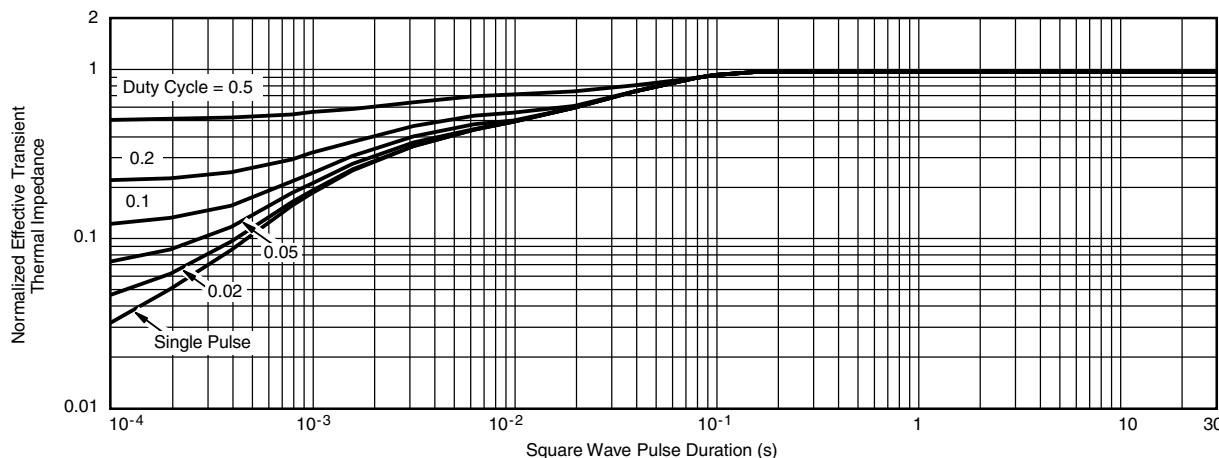
- a. Pulse test; pulse width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2 \%$ .
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.

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

**Output Characteristics**

**Transfer Characteristics**

**Transfer Characteristics**

**Transconductance**

**On-Resistance vs. Drain Current**

**Capacitance**

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

**Gate Charge**

**On-Resistance vs. Junction Temperature**

**Source Drain Diode Forward Voltage**

**On-Resistance vs. Gate-to-Source Voltage**

**Threshold Voltage**

**Drain Source Breakdown vs. Junction Temperature**

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


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

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

- The characteristics shown in the two graphs
    - Normalized Transient Thermal Impedance Junction-to-Ambient ( $25^\circ\text{C}$ )
    - Normalized Transient Thermal Impedance Junction-to-Case ( $25^\circ\text{C}$ )
- are given for general guidelines only to enable the user to get a "ball park" indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

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?67071](http://www.vishay.com/ppg?67071).



## TO-220

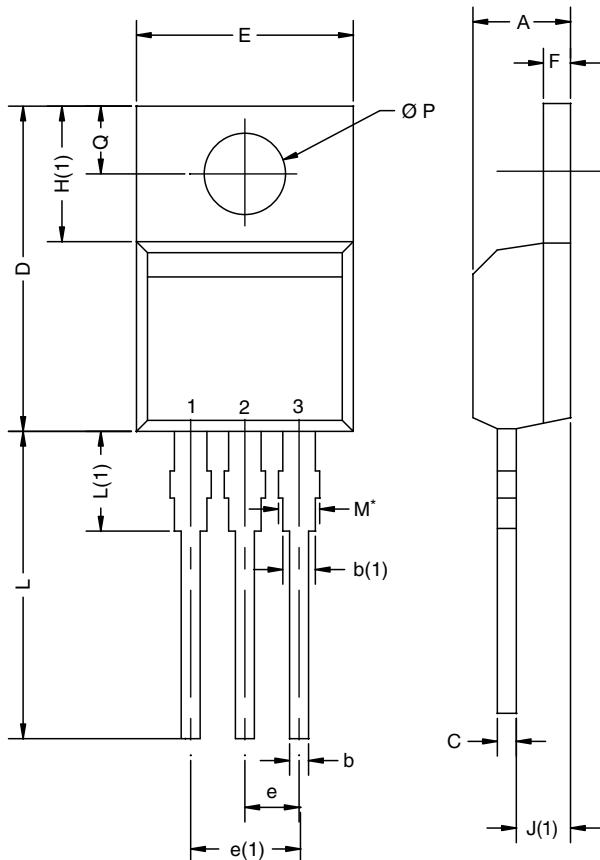
Ordering codes for the SQ rugged series power MOSFETs in the TO-220 package:

| DATASHEET PART NUMBER | OLD ORDERING CODE <sup>a</sup> | NEW ORDERING CODE  |
|-----------------------|--------------------------------|--------------------|
| SQP100N04-3m6         | -                              | SQP100N04-3M6_GE3  |
| SQP100P06-9m3L        | -                              | SQP100P06-9M3L_GE3 |
| SQP120N06-06          | -                              | SQP120N06-06_GE3   |
| SQP120N06-3m5L        | SQP120N06-3M5L-GE3             | SQP120N06-3M5L_GE3 |
| SQP120N10-09          | SQP120N10-09-GE3               | SQP120N10-09_GE3   |
| SQP120N10-3m8         | SQP120N10-3M8-GE3              | SQP120N10-3M8_GE3  |
| SQP25N15-52           | -                              | SQP25N15-52_GE3    |
| SQP50N06-09L          | SQP50N06-09L-GE3               | SQP50N06-09L_GE3   |
| SQP50P03-07           | SQP50P03-07-GE3                | SQP50P03-07_GE3    |
| SQP60N06-15           | SQP60N06-15-GE3                | SQP60N06-15_GE3    |
| SQP90P06-07L          | SQP90P06-07L-GE3               | SQP90P06-07L_GE3   |

**Note**

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

### TO-220AB



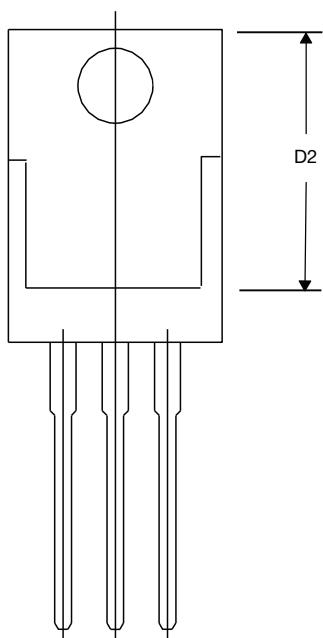
| DIM. | MILLIMETERS |       | INCHES |       |
|------|-------------|-------|--------|-------|
|      | MIN.        | MAX.  | MIN.   | MAX.  |
| A    | 4.25        | 4.65  | 0.167  | 0.183 |
| b    | 0.69        | 1.01  | 0.027  | 0.040 |
| b(1) | 1.20        | 1.73  | 0.047  | 0.068 |
| c    | 0.36        | 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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**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

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- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помошь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
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- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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Факс: 8 (812) 320-02-42

Электронная почта: [org@eplast1.ru](mailto:org@eplast1.ru)

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