

## MOS FIELD EFFECT TRANSISTOR

# 2SK2485

### SWITCHING N-CHANNEL POWER MOS FET INDUSTRIAL USE

#### DESCRIPTION

The 2SK2485 is N-Channel MOS Field Effect Transistor designed for high voltage switching applications.

#### FEATURES

- Low On-Resistance  
 $R_{DS(on)} = 2.8 \Omega$  ( $V_{GS} = 10 \text{ V}$ ,  $I_D = 3.0 \text{ A}$ )
- Low  $C_{iss}$   $C_{iss} = 1\,200 \text{ pF TYP.}$
- High Avalanche Capability Ratings

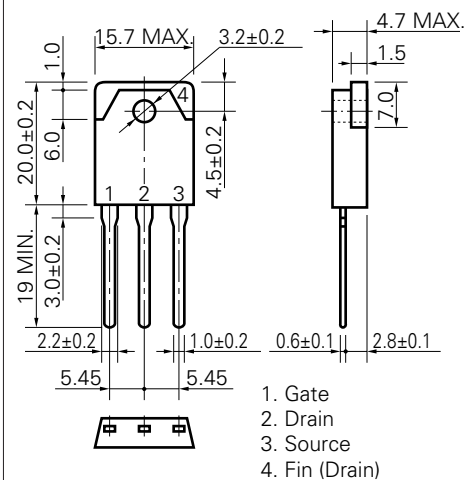
#### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

|                                                      |                     |             |                  |
|------------------------------------------------------|---------------------|-------------|------------------|
| Drain to Source Voltage                              | $V_{DSS}$           | 900         | V                |
| Gate to Source Voltage                               | $V_{GSS}$           | $\pm 30$    | V                |
| Drain Current (DC)                                   | $I_D(\text{DC})$    | $\pm 6.0$   | A                |
| Drain Current (pulse)*                               | $I_D(\text{pulse})$ | $\pm 12$    | A                |
| Total Power Dissipation ( $T_c = 25^\circ\text{C}$ ) | $P_{T1}$            | 100         | W                |
| Total Power Dissipation ( $T_A = 25^\circ\text{C}$ ) | $P_{T2}$            | 3.0         | W                |
| Channel Temperature                                  | $T_{ch}$            | 150         | $^\circ\text{C}$ |
| Storage Temperature                                  | $T_{stg}$           | -55 to +150 | $^\circ\text{C}$ |
| Single Avalanche Current**                           | $I_{AS}$            | 6.0         | A                |
| Single Avalanche Energy**                            | $E_{AS}$            | 42.3        | mJ               |

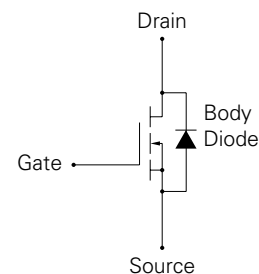
\*  $PW \leq 10 \mu\text{s}$ , Duty Cycle  $\leq 1\%$

\*\* Starting  $T_{ch} = 25^\circ\text{C}$ ,  $R_G = 25 \Omega$ ,  $V_{GS} = 20 \text{ V} \rightarrow 0$

#### PACKAGE DIMENSIONS (in millimeter)

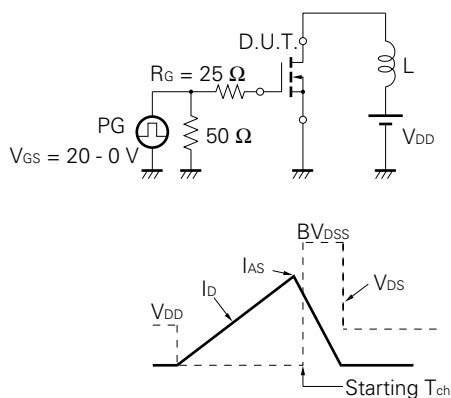
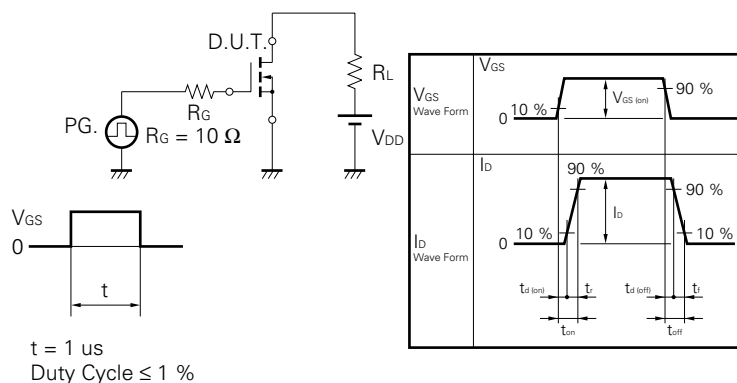
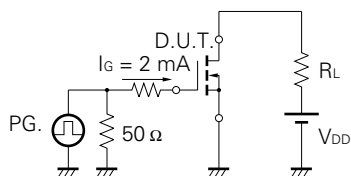


#### MP-88



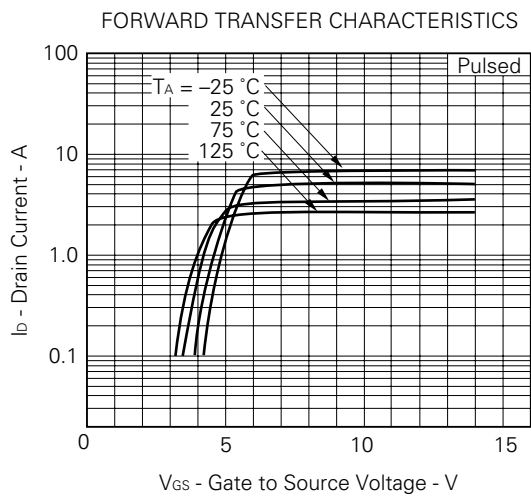
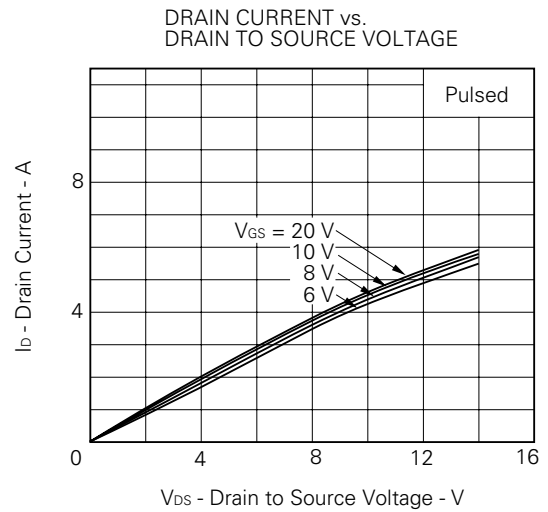
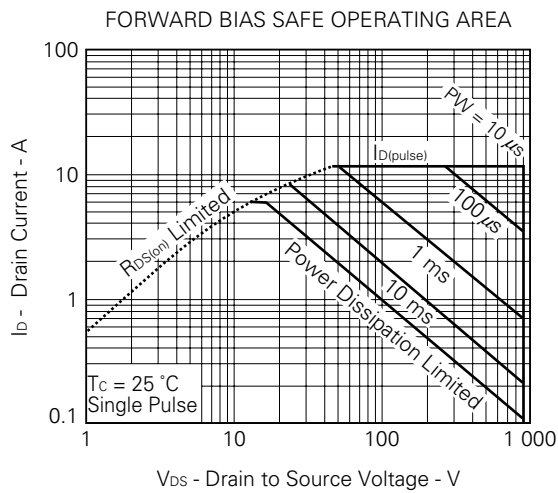
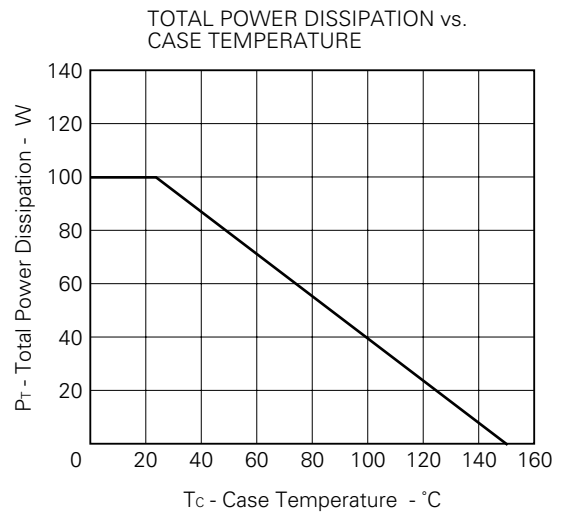
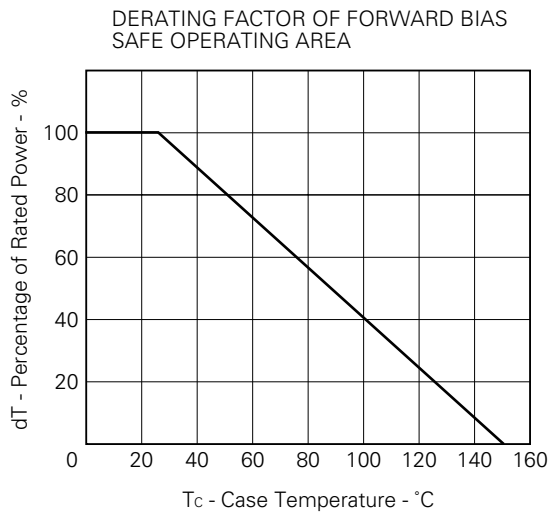
**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

| CHARACTERISTIC                 | SYMBOL               | MIN. | TYP. | MAX. | UNIT | TEST CONDITIONS                                                                                                            |
|--------------------------------|----------------------|------|------|------|------|----------------------------------------------------------------------------------------------------------------------------|
| Drain to Source On-Resistance  | R <sub>DS(on)</sub>  |      | 2.2  | 2.8  | Ω    | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 3.0 A                                                                             |
| Gate to Source Cutoff Voltage  | V <sub>GS(off)</sub> | 2.5  |      | 3.5  | V    | V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA                                                                              |
| Forward Transfer Admittance    | y <sub>fs</sub>      | 2.0  |      |      | S    | V <sub>DS</sub> = 10 V, I <sub>D</sub> = 3.0 A                                                                             |
| Drain Leakage Current          | I <sub>DSS</sub>     |      |      | 100  | μA   | V <sub>DS</sub> = V <sub>DSS</sub> , V <sub>GS</sub> = 0                                                                   |
| Gate to Source Leakage Current | I <sub>GSS</sub>     |      |      | ±100 | nA   | V <sub>GS</sub> = ±30 V, V <sub>DS</sub> = 0                                                                               |
| Input Capacitance              | C <sub>iss</sub>     |      | 1200 |      | pF   | V <sub>DS</sub> = 10 V<br>V <sub>GS</sub> = 0<br>f = 1 MHz                                                                 |
| Output Capacitance             | C <sub>oss</sub>     |      | 170  |      | pF   |                                                                                                                            |
| Reverse Transfer Capacitance   | C <sub>rss</sub>     |      | 30   |      | pF   |                                                                                                                            |
| Turn-On Delay Time             | t <sub>d(on)</sub>   |      | 20   |      | ns   | I <sub>D</sub> = 3.0 A<br>V <sub>GS</sub> = 10 V<br>V <sub>DD</sub> = 150 V<br>R <sub>G</sub> = 10 Ω R <sub>L</sub> = 50 Ω |
| Rise Time                      | t <sub>r</sub>       |      | 10   |      | ns   |                                                                                                                            |
| Turn-Off Delay Time            | t <sub>d(off)</sub>  |      | 70   |      | ns   |                                                                                                                            |
| Fall Time                      | t <sub>f</sub>       |      | 15   |      | ns   |                                                                                                                            |
| Total Gate Charge              | Q <sub>G</sub>       |      | 40   |      | nC   | I <sub>D</sub> = 6.0 A<br>V <sub>DD</sub> = 450 V<br>V <sub>GS</sub> = 10 V                                                |
| Gate to Source Charge          | Q <sub>GS</sub>      |      | 7    |      | nC   |                                                                                                                            |
| Gate to Drain Charge           | Q <sub>GD</sub>      |      | 17   |      | nC   |                                                                                                                            |
| Body Diode Forward Voltage     | V <sub>F(S-D)</sub>  |      | 1.0  |      | V    | I <sub>F</sub> = 6.0 A, V <sub>GS</sub> = 0                                                                                |
| Reverse Recovery Time          | t <sub>rr</sub>      |      | 740  |      | ns   | I <sub>F</sub> = 6.0 A, V <sub>GS</sub> = 0<br>di/dt = 50 A/μs                                                             |
| Reverse Recovery Charge        | Q <sub>rr</sub>      |      | 4.0  |      | μC   |                                                                                                                            |

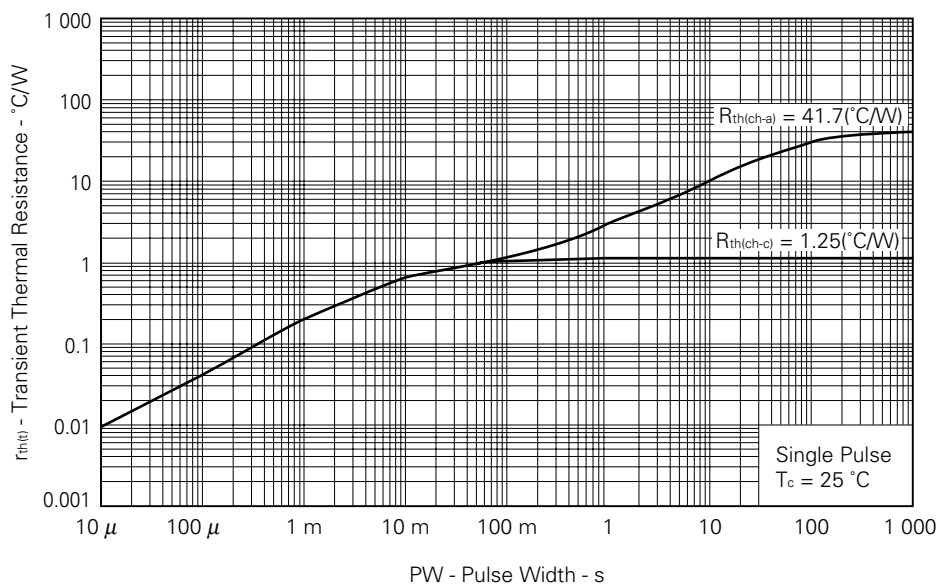
**Test Circuit 1 Avalanche Capability****Test Circuit 2 Switching Time****Test Circuit 3 Gate Charge**

The application circuits and their parameters are for references only and are not intended for use in actual design-in's.

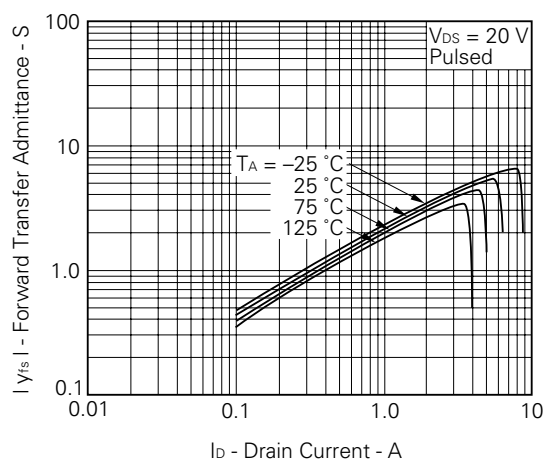
**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )**



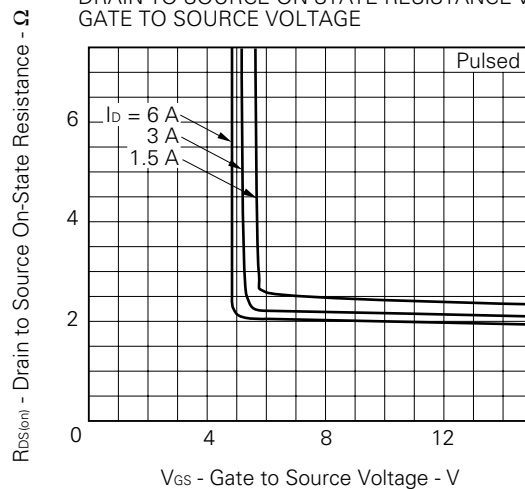
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



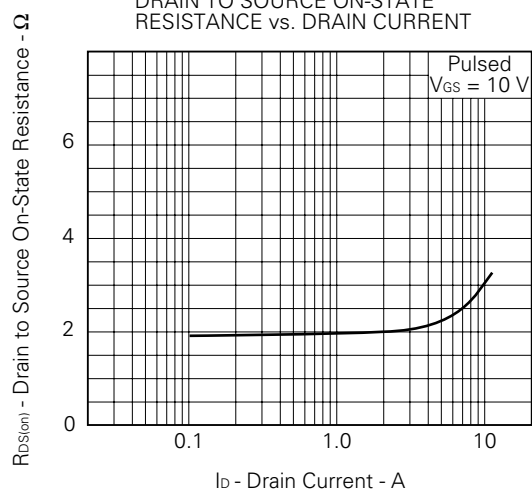
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



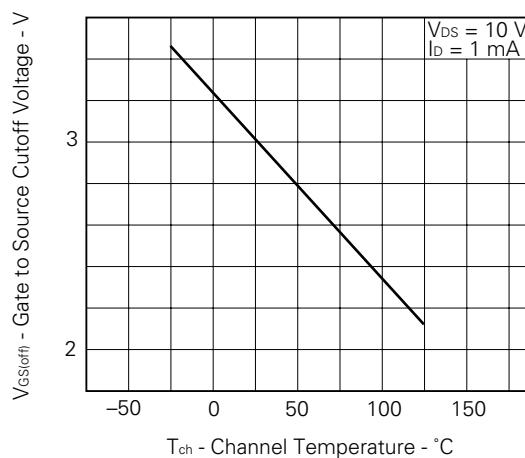
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

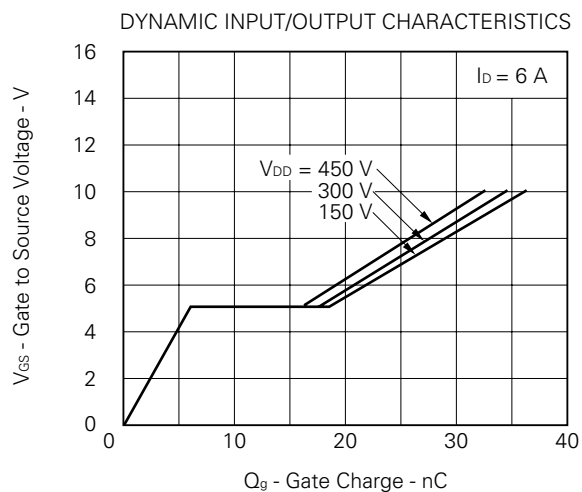
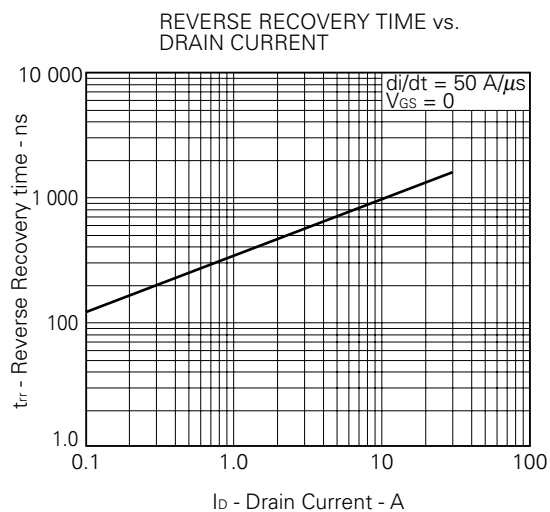
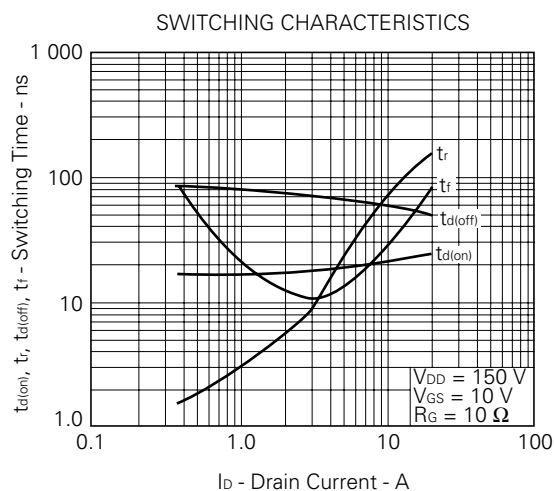
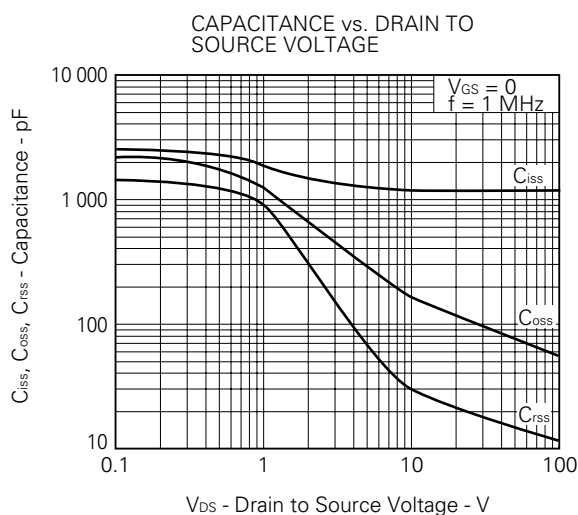
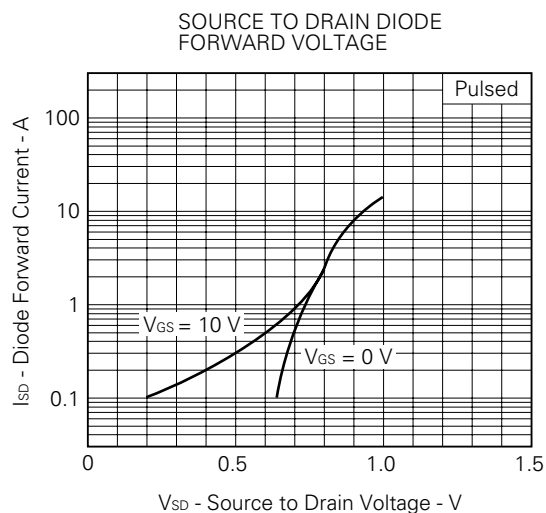
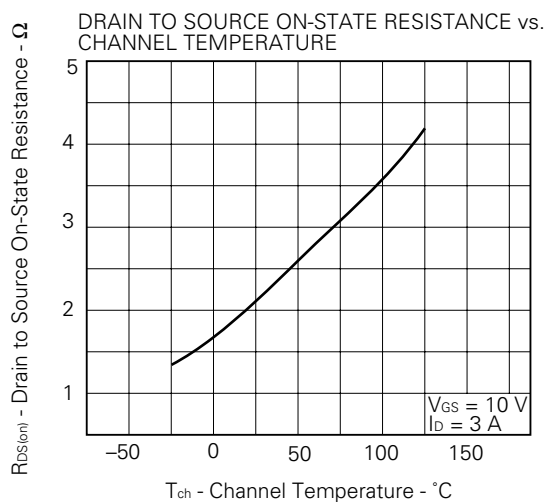


DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT

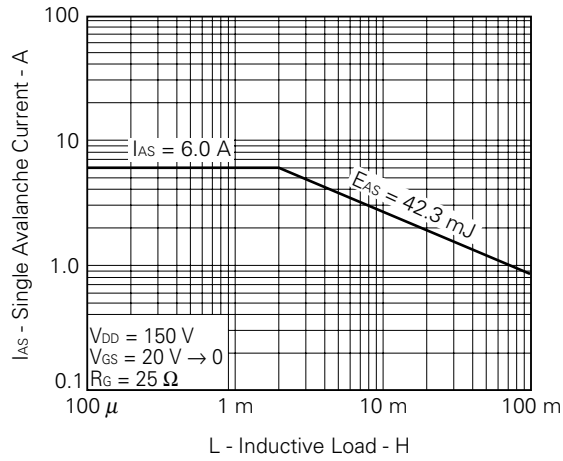


GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE

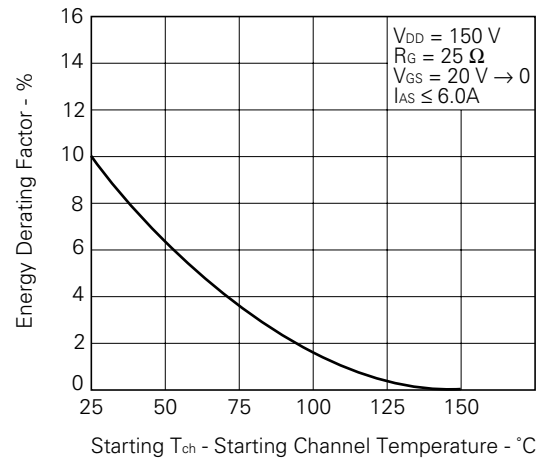




SINGLE AVALANCHE CURRENT vs.  
INDUCTIVE LOAD



SINGLE AVALANCHE ENERGY  
DERATING FACTOR



## REFERENCE

| Document Name                                                  | Document No. |
|----------------------------------------------------------------|--------------|
| NEC semiconductor device reliability/quality control system.   | TEI-1202     |
| Quality grade on NEC semiconductor devices.                    | IEI-1209     |
| Semiconductor device mounting technology manual.               | IEI-1207     |
| Semiconductor device package manual.                           | IEI-1213     |
| Guide to quality assurance for semiconductor devices.          | MEI-1202     |
| Semiconductor selection guide.                                 | MF-1134      |
| Power MOS FET features and application switching power supply. | TEA-1034     |
| Application circuits using Power MOS FET.                      | TEA-1035     |
| Safe operating area of Power MOS FET.                          | TEA-1037     |

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