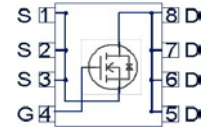


OptiMOS®3 M-Series Power-MOSFET
Features

- Optimized for 5V driver application (Notebook, VGA, POL)
- Low FOM_{SW} for High Frequency SMPS
- 100% Avalanche tested
- N-channel
- Very low on-resistance $R_{DS(on)}$ @ $V_{GS}=4.5\text{ V}$
- Excellent gate charge x $R_{DS(on)}$ product (FOM)
- Qualified for consumer level application
- Pb-free plating; RoHS compliant
- Halogen-free mold compound


Product Summary

| | | | |
|------------------|-----------------------|------|----|
| V_{DS} | | 30 | V |
| $R_{DS(on),max}$ | $V_{GS}=10\text{ V}$ | 8.3 | mΩ |
| | $V_{GS}=4.5\text{ V}$ | 10.5 | |
| I_D | | 14 | A |

PG-DSO-8


| Type | Package | Marking |
|---------------|----------|----------|
| BSO083N03MS G | PG-DSO-8 | 083N03MS |

Maximum ratings, at $T_j=25\text{ °C}$, unless otherwise specified

| Parameter | Symbol | Conditions | Value | | Unit |
|-----------------------------------------------|----------------|-----------------------------------------|-------------|--------------|------|
| | | | 10 secs | steady state | |
| Continuous drain current ¹⁾ | I_D | $V_{GS}=10\text{ V}, T_A=25\text{ °C}$ | 14 | 11 | A |
| | | $V_{GS}=10\text{ V}, T_A=90\text{ °C}$ | 9.7 | 7.6 | |
| | | $V_{GS}=4.5\text{ V}, T_A=25\text{ °C}$ | 12.4 | 9.8 | |
| | | $V_{GS}=4.5\text{ V}, T_A=90\text{ °C}$ | 8.6 | 6.8 | |
| Pulsed drain current ²⁾ | $I_{D,pulse}$ | $T_A=25\text{ °C}$ | 98 | | |
| Avalanche current, single pulse ³⁾ | I_{AS} | $T_A=25\text{ °C}$ | 14 | | |
| Avalanche energy, single pulse | E_{AS} | $I_D=14\text{ A}, R_{GS}=25\text{ Ω}$ | 35 | | mJ |
| Gate source voltage | V_{GS} | | ±16 | | V |
| Power dissipation ¹⁾ | P_{tot} | $T_A=25\text{ °C}$ | 2.5 | 1.56 | W |
| Operating and storage temperature | T_j, T_{stg} | | -55 ... 150 | | °C |
| IEC climatic category; DIN IEC 68-1 | | | 55/150/56 | | |

| Parameter | Symbol | Conditions | Values | | | Unit |
|-----------|--------|------------|--------|------|------|------|
| | | | min. | typ. | max. | |

Thermal characteristics

| | | | | | | |
|------------------------------------------------|------------|----------------------------------------------------------------|---|---|-----|-----|
| Thermal resistance, junction - soldering point | R_{thJS} | | - | - | 35 | K/W |
| Thermal resistance, junction - ambient | R_{thJA} | minimal footprint, $t_p \leq 10$ s | - | - | 110 | |
| | | minimal footprint, steady state | - | - | 150 | |
| | | 6 cm ² cooling area ¹⁾ , $t_p \leq 10$ s | - | - | 50 | |
| | | 6 cm ² cooling area ¹⁾ , steady state | - | - | 80 | |

Electrical characteristics, at $T_j=25$ °C, unless otherwise specified
Static characteristics

| | | | | | | |
|----------------------------------|---------------|-----------------------------------------------|-----|-----|------|------------|
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS}=0$ V, $I_D=1$ mA | 30 | - | - | V |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}$, $I_D=250$ μ A | 1 | - | 2 | |
| Zero gate voltage drain current | I_{DSS} | $V_{DS}=30$ V, $V_{GS}=0$ V, $T_j=25$ °C | - | 0.1 | 10 | μ A |
| | | $V_{DS}=30$ V, $V_{GS}=0$ V, $T_j=125$ °C | - | 10 | 100 | |
| Gate-source leakage current | I_{GSS} | $V_{GS}=16$ V, $V_{DS}=0$ V | - | 10 | 100 | nA |
| Drain-source on-state resistance | $R_{DS(on)}$ | $V_{GS}=4.5$ V, $I_D=12.4$ A | - | 8.4 | 10.5 | m Ω |
| | | $V_{GS}=10$ V, $I_D=14$ A | - | 6.9 | 8.3 | |
| Gate resistance | R_G | | 0.5 | 1 | 1.8 | Ω |
| Transconductance | g_{fs} | $ V_{DS} > 2 I_D R_{DS(on)max}$, $I_D=14$ A | 20 | 39 | - | S |

¹⁾ Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm² (one layer, 70 μ m thick) copper area for drain connection. PCB is vertical in still air.

²⁾ See figure 3 for more detailed information

³⁾ See figure 13 for more detailed information

| Parameter | Symbol | Conditions | Values | | | Unit |
|-----------|--------|------------|--------|------|------|------|
| | | | min. | typ. | max. | |

Dynamic characteristics

| | | | | | | |
|------------------------------|--------------|----------------------------------------------------------------------------------|---|------|------|----|
| Input capacitance | C_{iss} | $V_{GS}=0\text{ V}, V_{DS}=15\text{ V},$ $f=1\text{ MHz}$ | - | 1600 | 2100 | pF |
| Output capacitance | C_{oss} | | - | 510 | 680 | |
| Reverse transfer capacitance | C_{rss} | | - | 33 | - | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}=15\text{ V}, V_{GS}=4.5\text{ V},$ $I_D=14\text{ A}, R_G=1.6\ \Omega$ | - | 9.4 | - | ns |
| Rise time | t_r | | - | 5 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 11.5 | - | |
| Fall time | t_f | | - | 5.4 | - | |

Gate Charge Characteristics⁴⁾

| | | | | | | |
|------------------------------|---------------|-----------------------------------------------------------------------------|---|------|------|----|
| Gate to source charge | Q_{gs} | $V_{DD}=15\text{ V}, I_D=14\text{ A},$ $V_{GS}=0\text{ to }4.5\text{ V}$ | - | 4.5 | - | nC |
| Gate charge at threshold | $Q_{g(th)}$ | | - | 2.5 | - | |
| Gate to drain charge | Q_{gd} | | - | 2.2 | - | |
| Switching charge | Q_{sw} | | - | 4.2 | - | |
| Gate charge total | Q_g | | - | 9.9 | 13 | |
| Gate plateau voltage | $V_{plateau}$ | | - | 2.9 | - | |
| Gate charge total | Q_g | $V_{DD}=15\text{ V}, I_D=14\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$ | - | 21 | 27 | nC |
| Gate charge total, sync. FET | $Q_{g(sync)}$ | $V_{DS}=0.1\text{ V},$ $V_{GS}=0\text{ to }4.5\text{ V}$ | - | 8.6 | 11.4 | |
| Output charge | Q_{oss} | $V_{DD}=15\text{ V}, V_{GS}=0\text{ V}$ | - | 13.4 | 18 | |

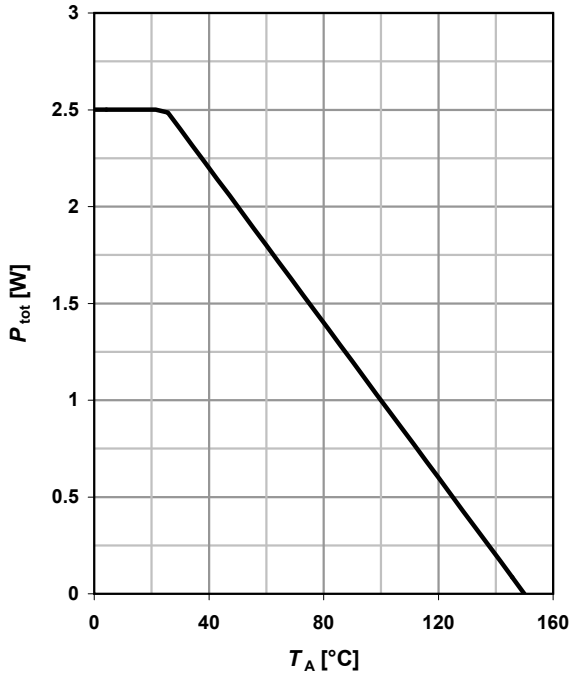
Reverse Diode

| | | | | | | |
|----------------------------------|---------------|-------------------------------------------------------------------------|---|------|-----|----|
| Diode continuous forward current | I_S | $T_A=25\text{ }^\circ\text{C}$ | - | - | 3 | A |
| Diode pulse current | $I_{S,pulse}$ | | - | - | 98 | |
| Diode forward voltage | V_{SD} | $V_{GS}=0\text{ V}, I_F=14\text{ A},$ $T_j=25\text{ }^\circ\text{C}$ | - | 0.85 | 1.1 | V |
| Reverse recovery charge | Q_{rr} | $V_R=15\text{ V}, I_F=I_S,$ $di_F/dt=400\text{ A}/\mu\text{s}$ | - | - | 10 | nC |

⁴⁾ See figure 16 for gate charge parameter definition

1 Power dissipation

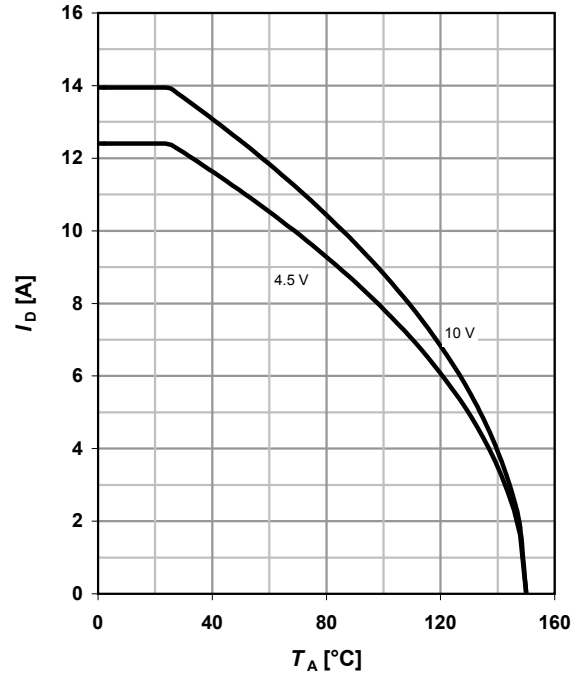
$P_{tot}=f(T_A); t_p \leq 10 \text{ s}$



2 Drain current

$I_D=f(T_A); t_p \leq 10 \text{ s}$

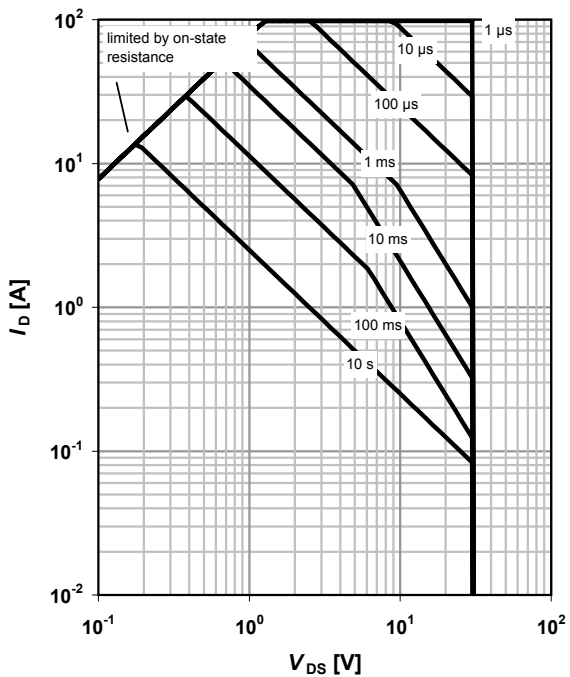
parameter: V_{GS}



3 Safe operating area

$I_D=f(V_{DS}); T_A=25 \text{ °C}^2; D=0$

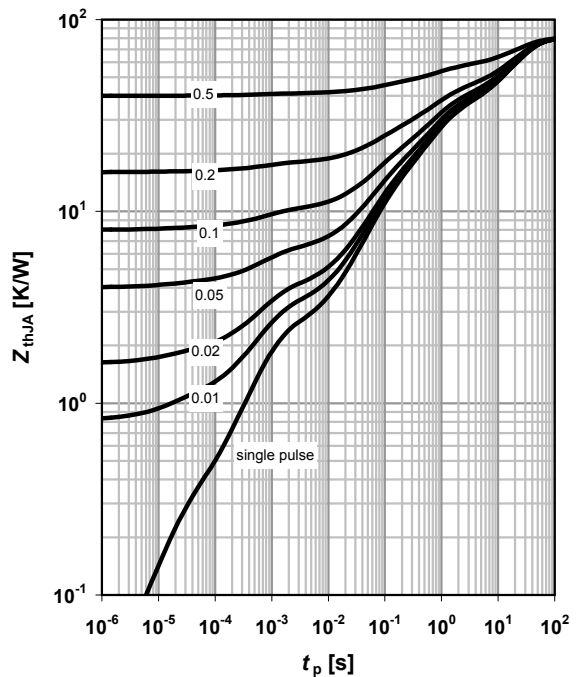
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJA}=f(t_p^2)$

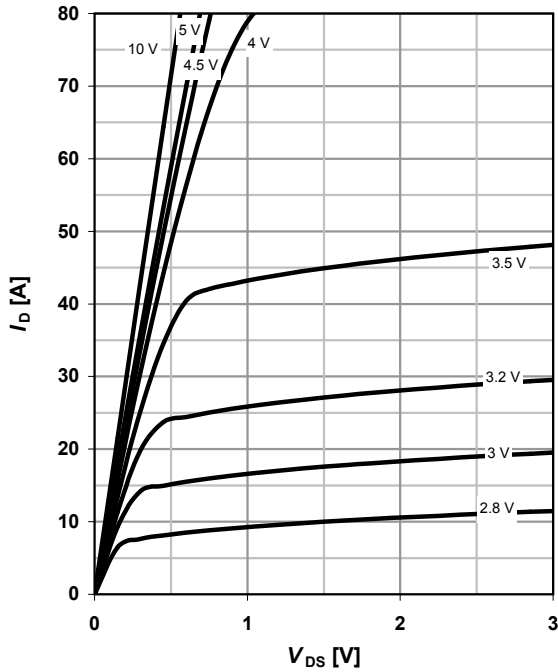
parameter: $D=t_p/T$



5 Typ. output characteristics

$I_D = f(V_{DS}); T_j = 25\text{ }^\circ\text{C}$

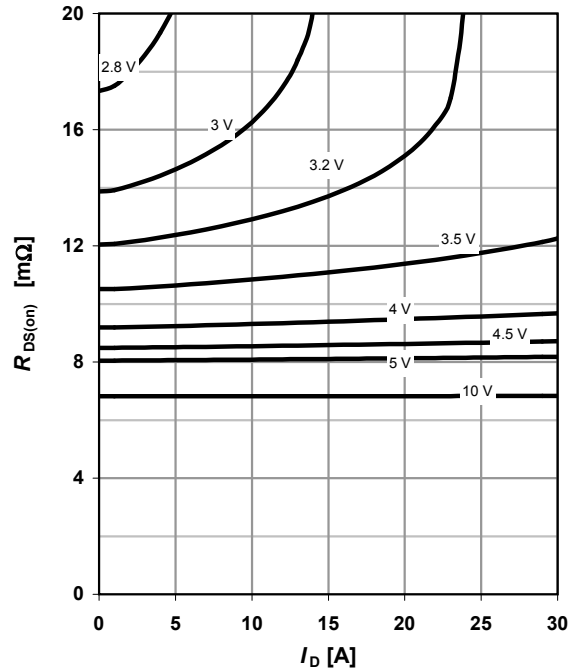
parameter: V_{GS}



6 Typ. drain-source on resistance

$R_{DS(on)} = f(I_D); T_j = 25\text{ }^\circ\text{C}$

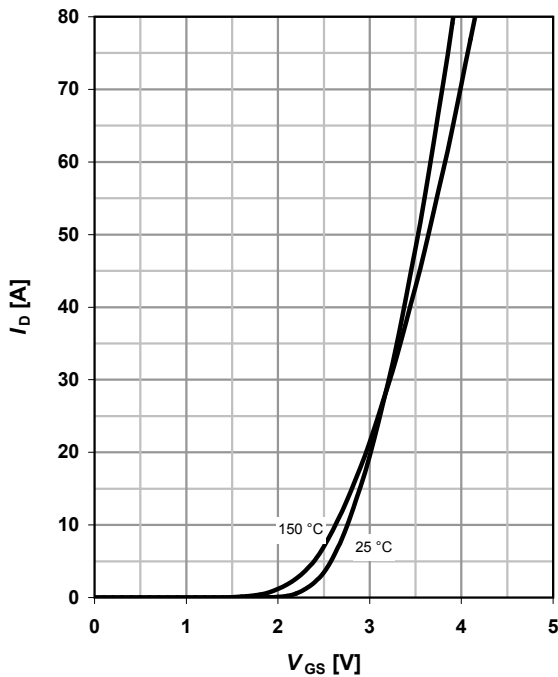
parameter: V_{GS}



7 Typ. transfer characteristics

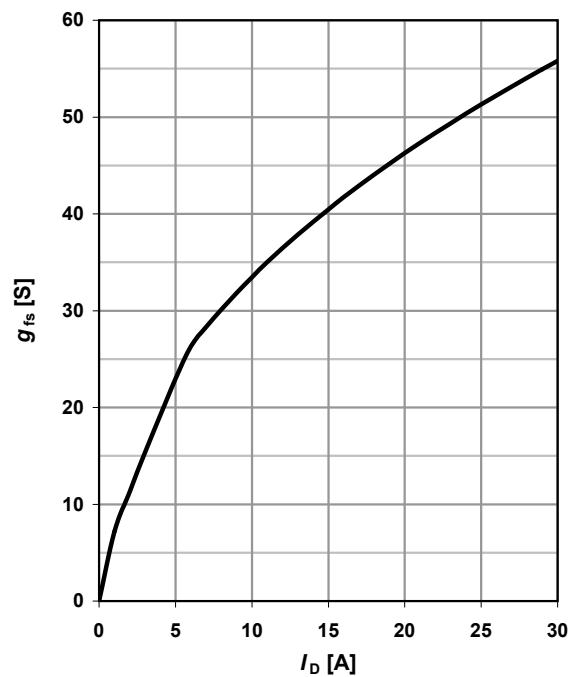
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter: T_j



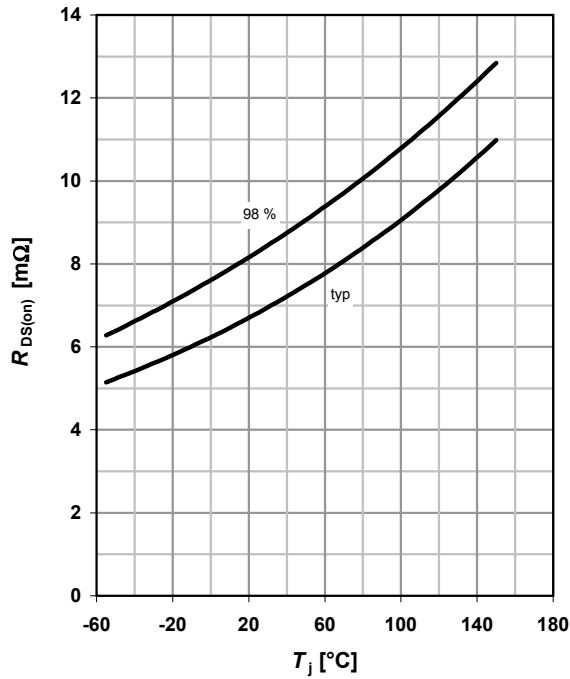
8 Typ. forward transconductance

$g_{fs} = f(I_D); T_j = 25\text{ }^\circ\text{C}$



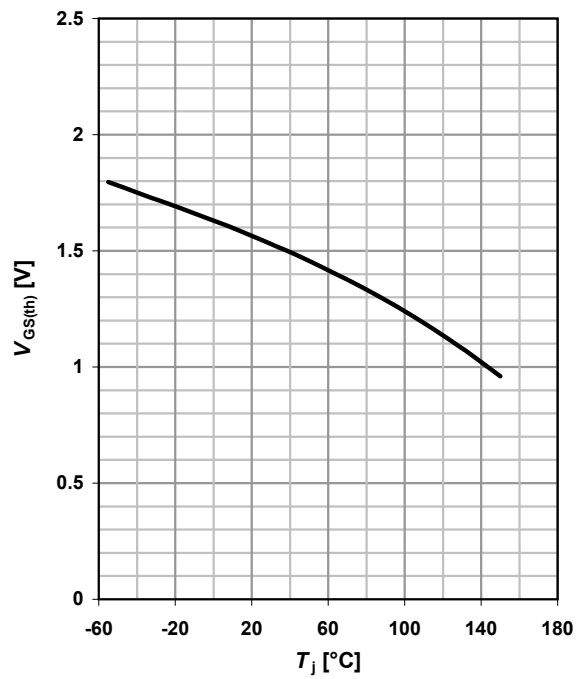
9 Drain-source on-state resistance

$R_{DS(on)} = f(T_j); I_D = 14 \text{ A}; V_{GS} = 10 \text{ V}$



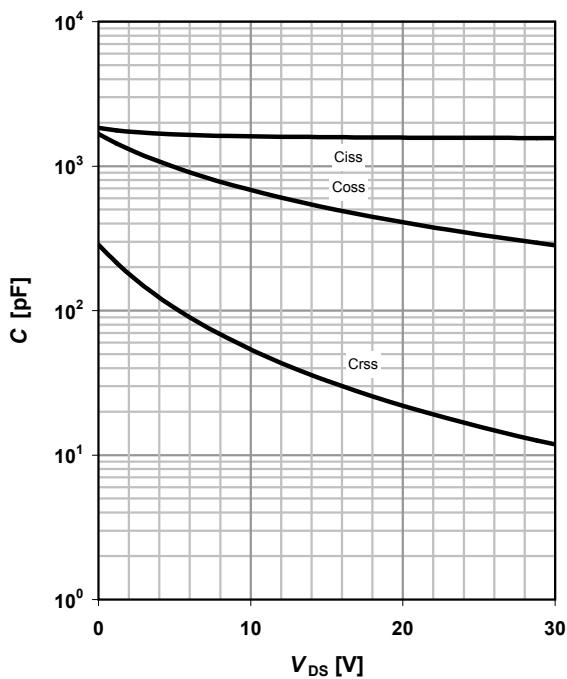
10 Typ. gate threshold voltage

$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}; I_D = 250 \mu\text{A}$



11 Typ. capacitances

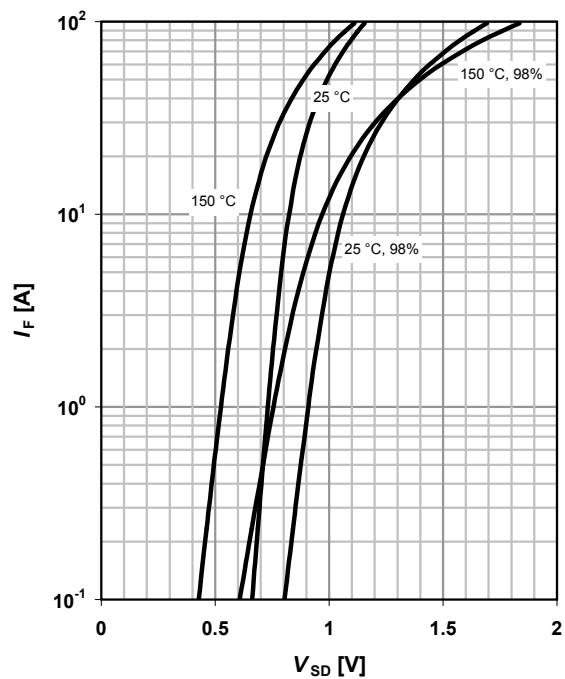
$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$



12 Forward characteristics of reverse diode

$I_F = f(V_{SD})$

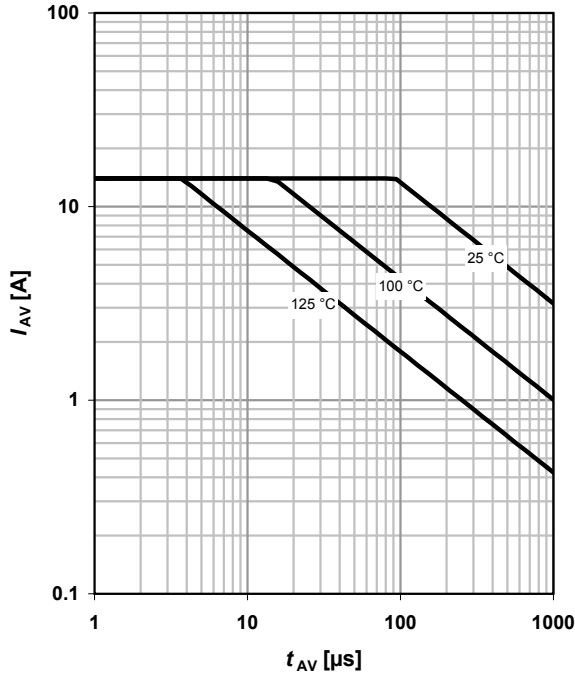
parameter: T_j



13 Avalanche characteristics

$I_{AS}=f(t_{AV}); R_{GS}=25 \Omega$

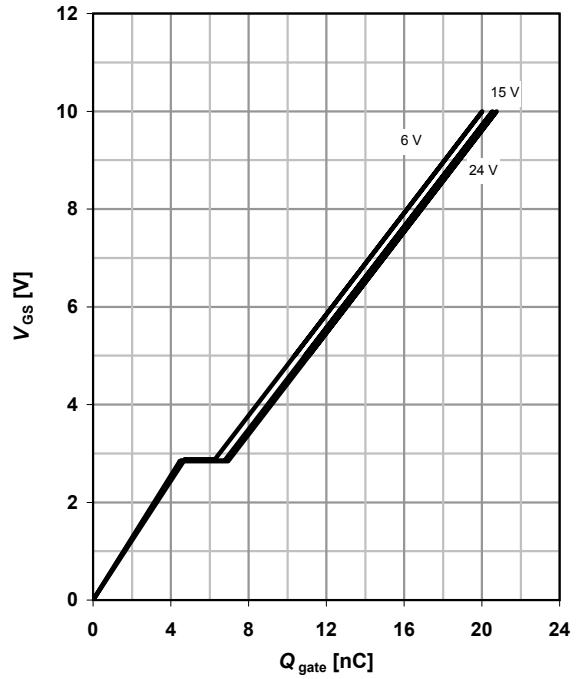
parameter: $T_{j(start)}$



14 Typ. gate charge

$V_{GS}=f(Q_{gate}); I_D=14 \text{ A pulsed}$

parameter: V_{DD}



15 Drain-source breakdown voltage

$V_{BR(DSS)}=f(T_j); I_D=1 \text{ mA}$



16 Gate charge waveforms



Package Outline

PG-DSO-8: Outline



1) DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS.

| DIM | MILLIMETERS | | INCHES | |
|--------|-------------|------|--------|-------|
| | MIN | MAX | MIN | MAX |
| A | - | 1.75 | - | 0.069 |
| A1 | 0.10 | - | 0.004 | - |
| A2 | 1.25 | 1.65 | 0.049 | 0.065 |
| b | 0.35 | 0.51 | 0.014 | 0.020 |
| c | 0.17 | 0.25 | 0.007 | 0.010 |
| D | 4.80 | 5.00 | 0.189 | 0.197 |
| E | 5.80 | 6.20 | 0.228 | 0.244 |
| E1 | 3.80 | 4.00 | 0.150 | 0.157 |
| e | 1.27 | | 0.050 | |
| N | 8 | | 8 | |
| L | 0.39 | 0.89 | 0.015 | 0.035 |
| h | 0.23 | 0.50 | 0.009 | 0.020 |
| theta | 0° | 8° | 0° | 8° |
| theta1 | - | 19° | - | 19° |
| ccc | 0.10 | | 0.004 | |
| ddd | 0.25 | | 0.010 | |
| F1 | 5.59 | 5.79 | 0.220 | 0.228 |
| F2 | 0.55 | 0.75 | 0.022 | 0.030 |
| F3 | 1.21 | 1.41 | 0.048 | 0.056 |

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