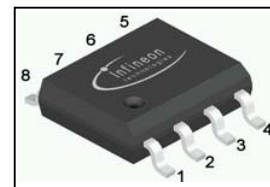


OptiMOS™-P Power-Transistor
Features

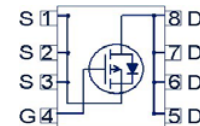
- P-Channel
- Enhancement mode
- Logic level
- 150°C operating temperature
- Avalanche rated
- dv/dt rated
- Ideal for fast switching buck converter

Product Summary

| | | |
|------------------|-------|------------|
| V_{DS} | -30 | V |
| $R_{DS(on),max}$ | 13 | m Ω |
| I_D | -11.3 | A |

P-DSO-8


| Type | Package | Marking |
|------------|---------|---------|
| BSO130P03S | P-DSO-8 | 130P3S |


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

| Parameter | Symbol | Conditions | Value | | Unit |
|-------------------------------------|-------------------|--|----------------|--------------|-------------------|
| | | | ≤ 10 secs | steady state | |
| Continuous drain current | I_D | $T_A=25\text{ }^\circ\text{C}^{(1)}$ | -11.3 | -9.2 | A |
| | | $T_A=70\text{ }^\circ\text{C}^{(1)}$ | -9.1 | -7.4 | |
| Pulsed drain current | $I_{D,pulse}$ | $T_A=25\text{ }^\circ\text{C}^{(2)}$ | -45 | | |
| Avalanche energy, single pulse | E_{AS} | $I_D=11.3\text{ A}$, $R_{GS}=25\text{ }\Omega$ | 148 | | mJ |
| Reverse diode dv/dt | dv/dt | $I_D=11.3\text{ A}$, $V_{DS}=20\text{ V}$, $di/dt=-200\text{ A}/\mu\text{s}$, $T_{j,max}=150\text{ }^\circ\text{C}$ | -6 | | kV/ μs |
| Gate source voltage | V_{GS} | | ± 25 | | V |
| Power dissipation | P_{tot} | $T_A=25\text{ }^\circ\text{C}^{(1)}$ | 2.36 | 1.56 | W |
| Operating and storage temperature | T_j , T_{stg} | | -55 ... 150 | | $^\circ\text{C}$ |
| 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 | - | - | 53 | |
| | | 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, $I_D=-250$ μ A | -30 | - | - | V |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}$, $I_D=-140$ μ A | -1 | -1.5 | -2.2 | |
| Zero gate voltage drain current | I_{DSS} | $V_{DS}=-30$ V, $V_{GS}=0$ V, $T_j=25$ °C | - | -0.1 | -1 | μ A |
| | | $V_{DS}=-30$ V, $V_{GS}=0$ V, $T_j=125$ °C | - | -10 | -100 | |
| Gate-source leakage current | I_{GSS} | $V_{GS}=-25$ V, $V_{DS}=0$ V | - | -10 | -100 | nA |
| Drain-source on-state resistance | $R_{DS(on)}$ | $V_{GS}=-10$ V, $I_D=-11.3$ A | - | 9.9 | 13.0 | m Ω |
| Transconductance | g_{fs} | $ V_{DS} > 2 I_D R_{DS(on)max}$, $I_D=-9.5$ A | 14 | 27 | - | 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.

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

Dynamic characteristics

| | | | | | | |
|------------------------------|--------------|--|---|------|------|----|
| Input capacitance | C_{iss} | $V_{GS}=0\text{ V},$ $V_{DS}=-25\text{ V}, f=1\text{ MHz}$ | - | 2650 | 3520 | pF |
| Output capacitance | C_{oss} | | - | 708 | 942 | |
| Reverse transfer capacitance | C_{rss} | | - | 580 | 870 | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}=-15\text{ V},$ $V_{GS}=-10\text{ V},$ $I_D=-1\text{ A}, R_G=6\ \Omega$ | - | 13 | 20 | ns |
| Rise time | t_r | | - | 16 | 24 | |
| Turn-off delay time | $t_{d(off)}$ | | - | 70 | 105 | |
| Fall time | t_f | | - | 62 | 93 | |

Gate Charge Characteristics³⁾

| | | | | | | |
|--------------------------|---------------|--|---|------|------|----|
| Gate to source charge | Q_{gs} | $V_{DD}=-24\text{ V}, I_D=11.3\text{ A},$ $V_{GS}=0\text{ to }-10\text{ V}$ | - | -7 | -9 | nC |
| Gate charge at threshold | $Q_{g(th)}$ | | - | -3.7 | -5.0 | |
| Gate to drain charge | Q_{gd} | | - | -21 | -32 | |
| Switching charge | Q_{sw} | | - | -25 | -36 | |
| Gate charge total | Q_g | | - | -61 | -81 | |
| Gate plateau voltage | $V_{plateau}$ | | - | -2.6 | - | V |
| Output charge | Q_{oss} | $V_{DD}=-15\text{ V}, V_{GS}=0\text{ V}$ | - | -22 | -29 | |

Reverse Diode

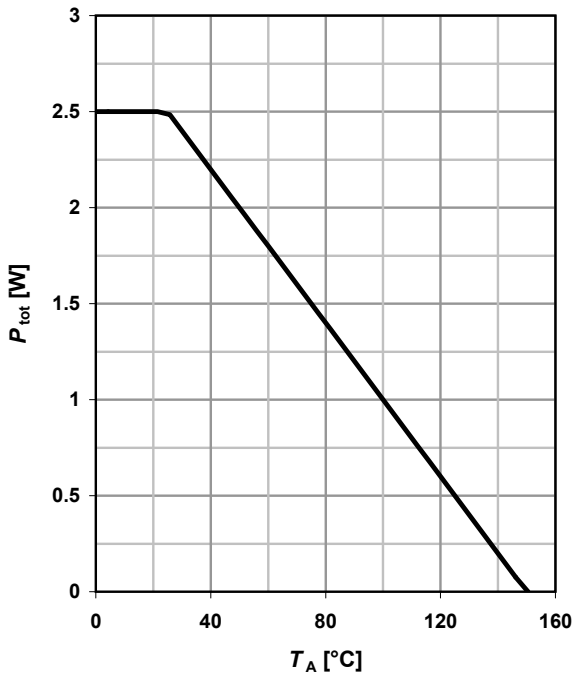
| | | | | | | |
|----------------------------------|---------------|--|---|-------|------|----|
| Diode continuous forward current | I_S | $T_A=25\text{ }^\circ\text{C}$ | - | - | -2.1 | A |
| Diode pulse current | $I_{S,pulse}$ | | - | - | -45 | |
| Diode forward voltage | V_{SD} | $V_{GS}=0\text{ V}, I_F=-11.3\text{ A},$ $T_j=25\text{ }^\circ\text{C}$ | - | -0.84 | -1.2 | V |
| Reverse recovery time | t_{rr} | $V_R=15\text{ V}, I_F=-11.3\text{ A},$ $di_F/dt=100\text{ A}/\mu\text{s}$ | - | 26 | 33 | ns |
| Reverse recovery charge | Q_{rr} | | - | 16 | 20 | |

²⁾ See figure 3

³⁾ See figure 16 for gate charge parameter definition

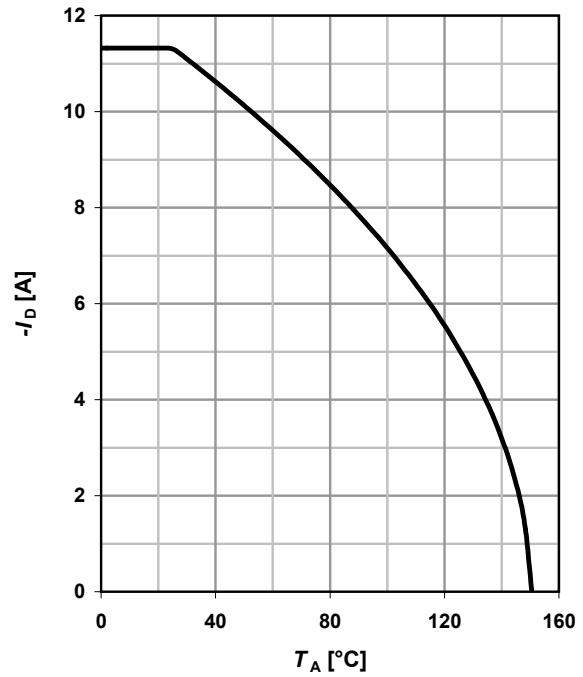
1 Power dissipation

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



2 Drain current

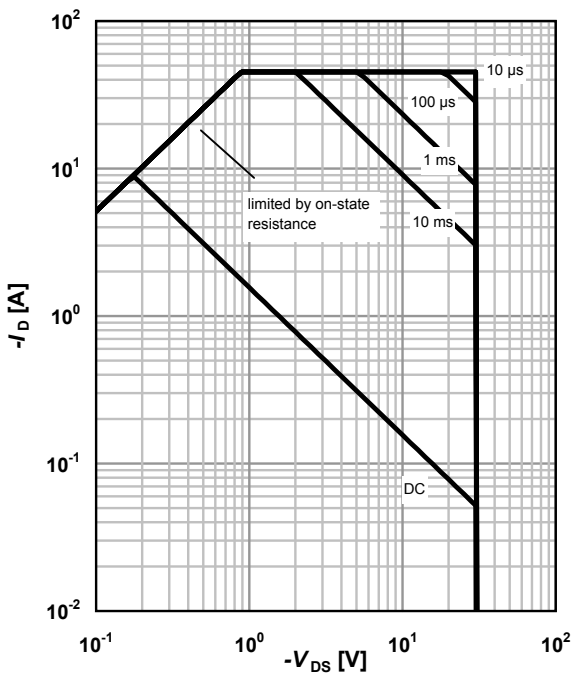
$I_D=f(T_A); |V_{GS}| \geq 10 \text{ V}; t_p \leq 10 \text{ s}$



3 Safe operating area

$I_D=f(V_{DS}); T_A=25 \text{ °C}^1; D=0$

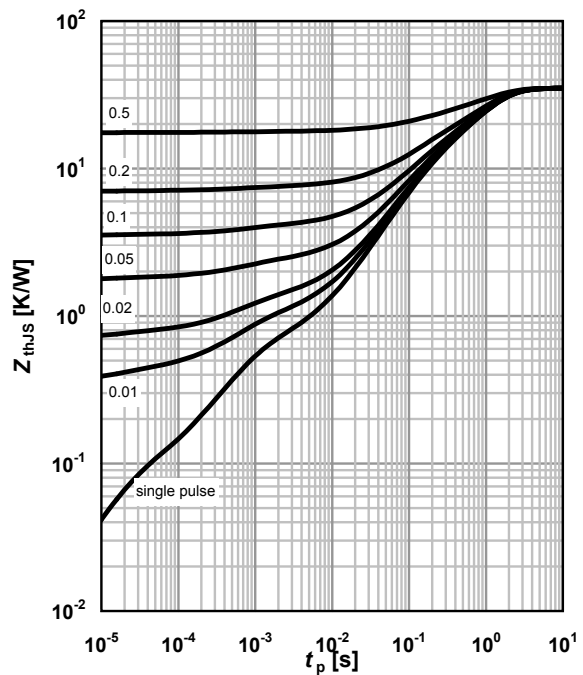
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJS}=f(t_p)$

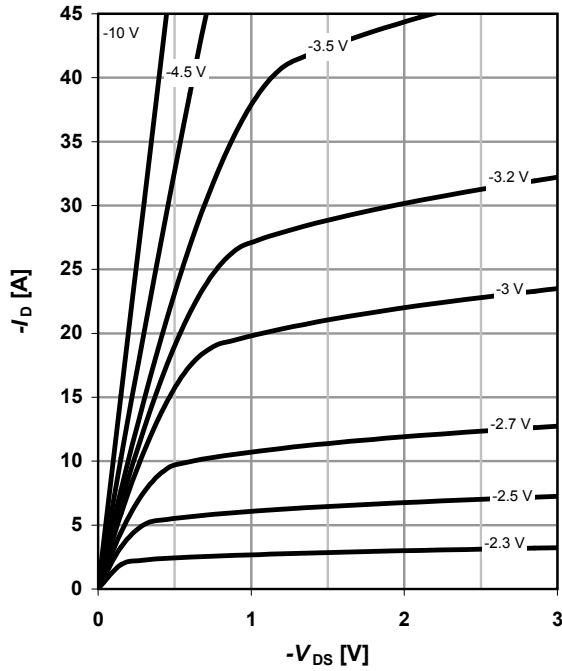
parameter: $D=t_p/T$



5 Typ. output characteristics

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

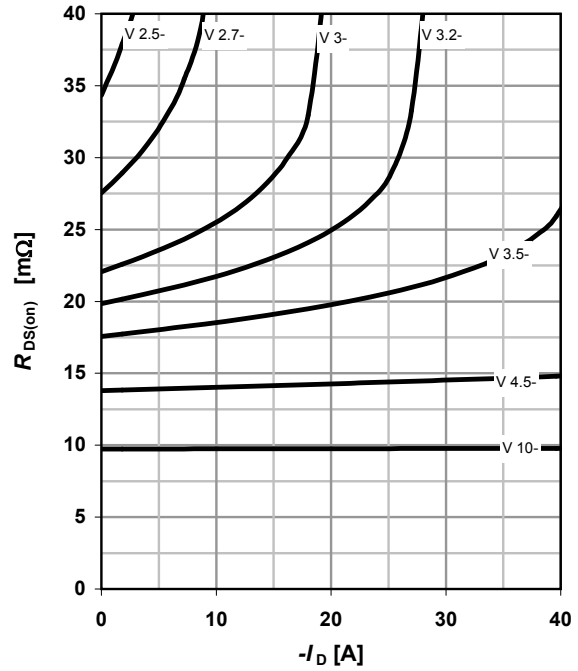
parameter: V_{GS}



6 Typ. drain-source on resistance

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

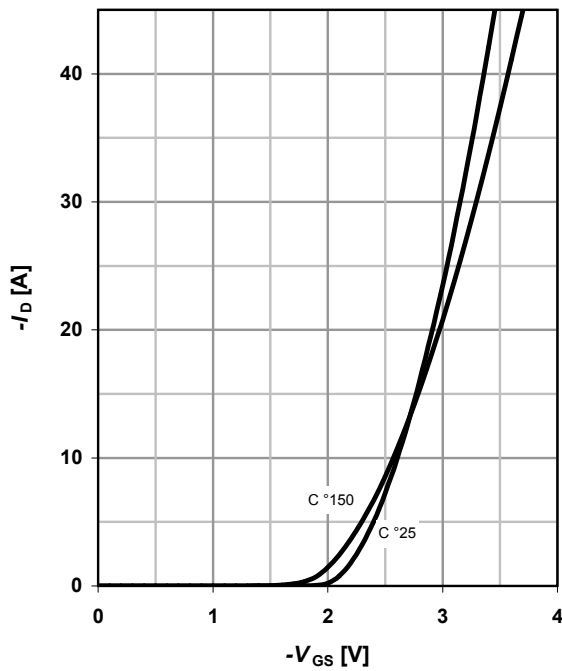
parameter: V_{GS}



7 Typ. transfer characteristics

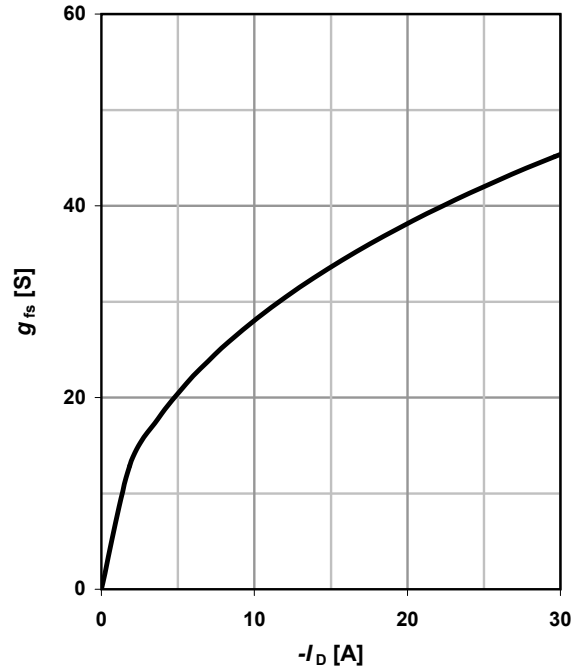
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter: T_j



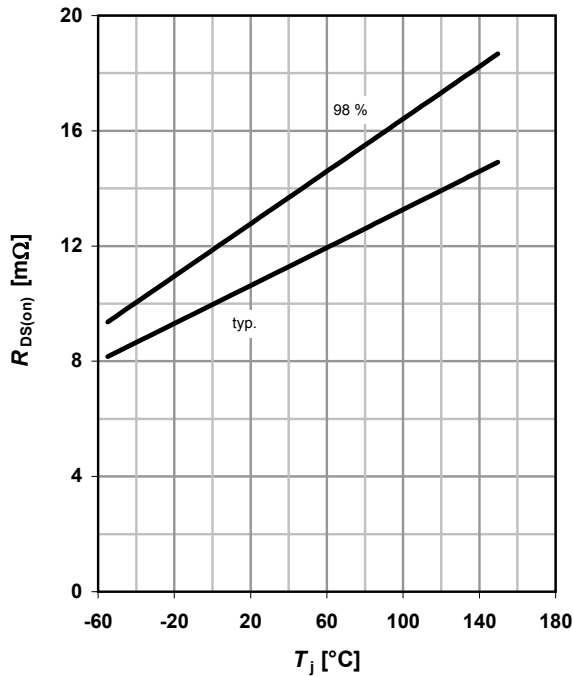
8 Typ. forward transconductance

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



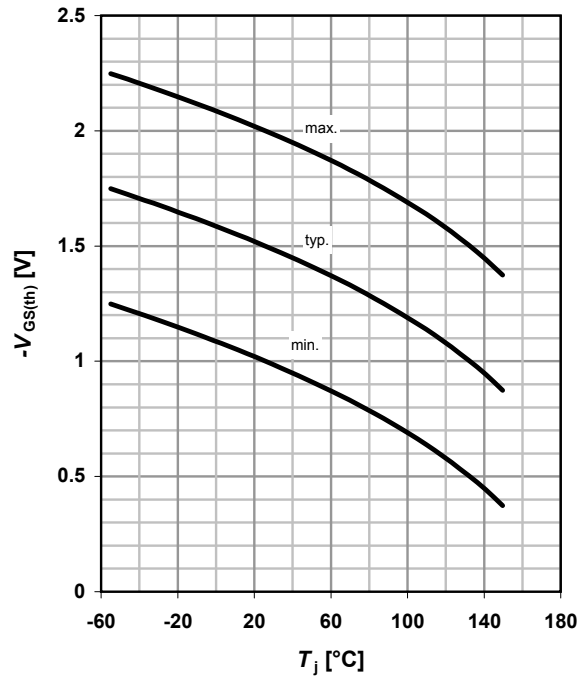
9 Drain-source on-state resistance

$R_{DS(on)} = f(T_j); I_D = -11.3 \text{ A}; V_{GS} = -10 \text{ V}$



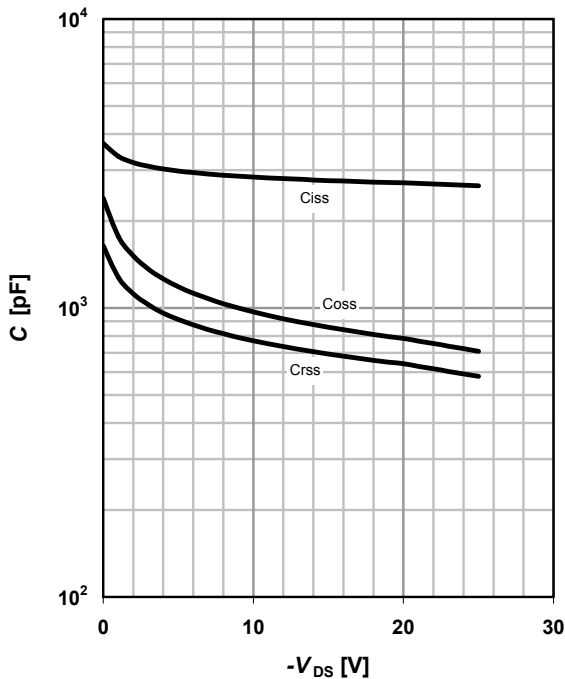
10 Typ. gate threshold voltage

$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}; I_D = -140 \mu\text{A}$



11 Typ. capacitances

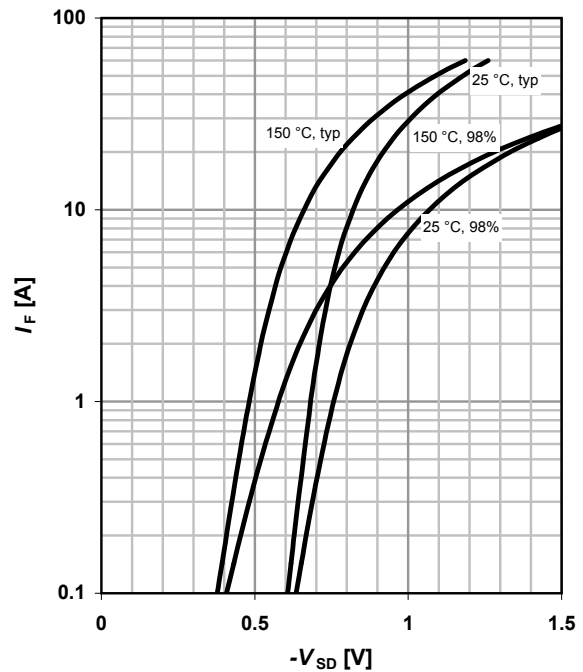
$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$



12 Forward characteristics of reverse diode

$I_F = f(V_{SD})$

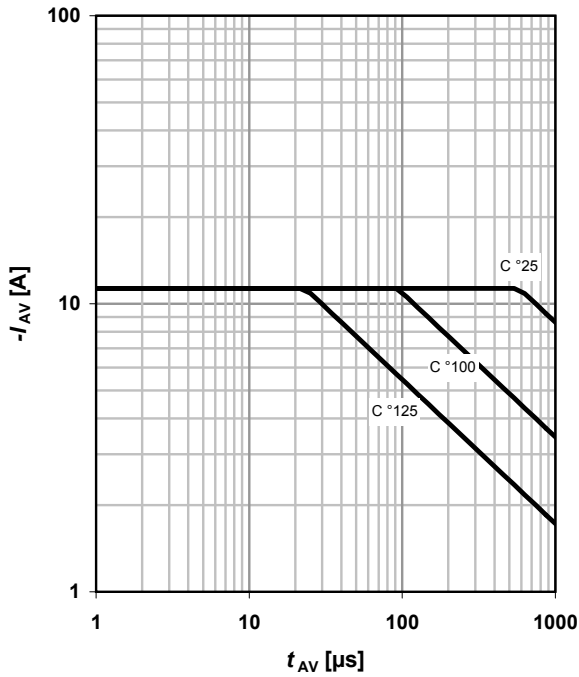
parameter: T_j



13 Avalanche characteristics

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

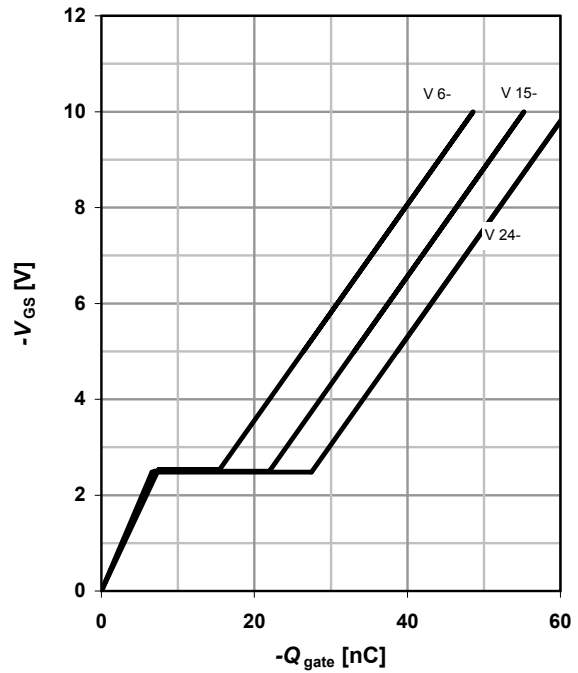
parameter: $T_{j(start)}$



14 Typ. gate charge

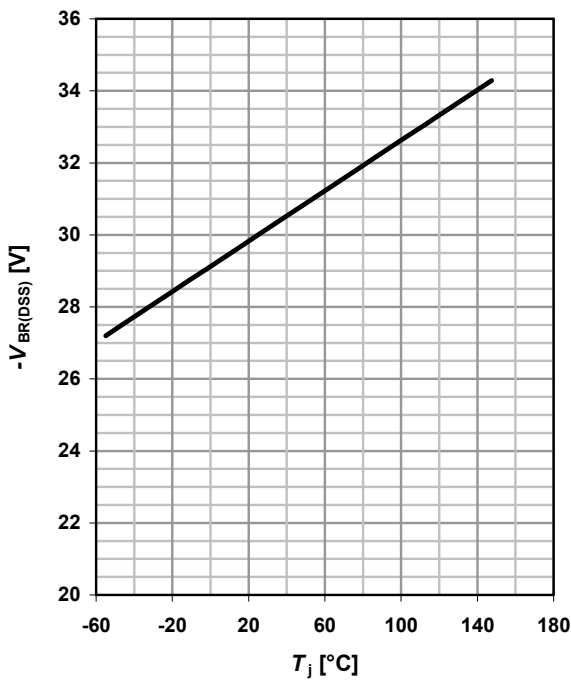
$V_{GS}=f(Q_{gate}); I_D=-5.5$ A pulsed

parameter: V_{DD}

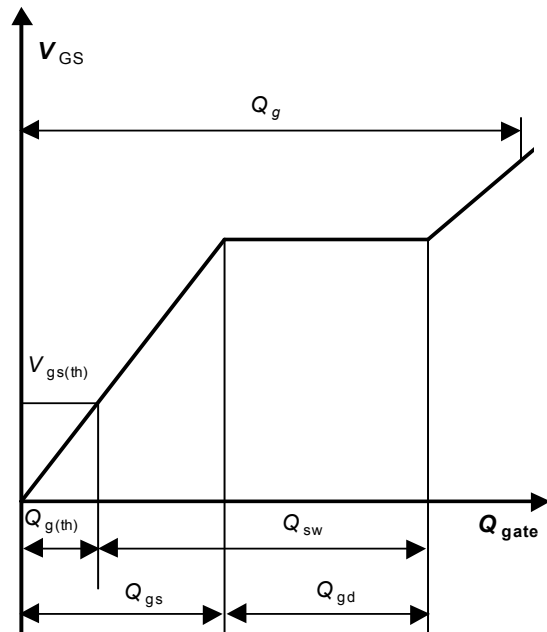


15 Drain-source breakdown voltage

$V_{BR(DSS)}=f(T_j); I_D=-250 \mu$ A

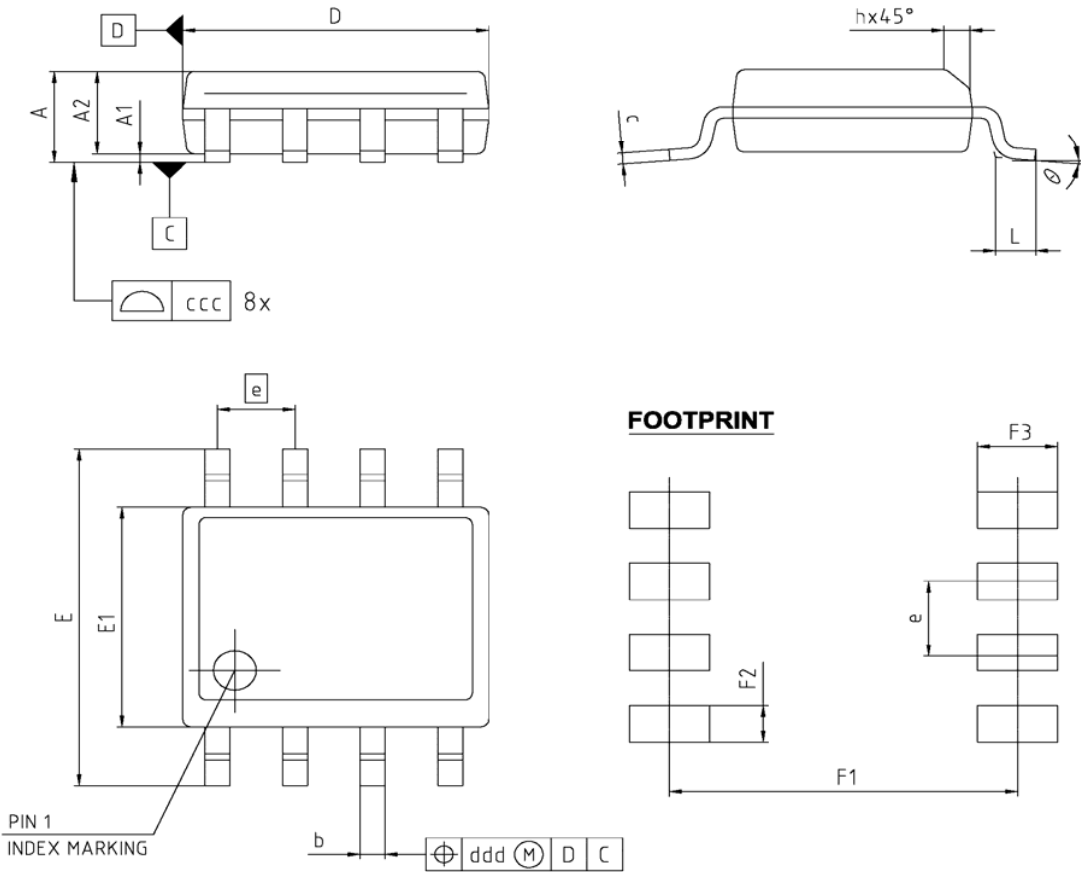


16 Gate charge waveforms



Package Outline

P-DSO-8: Outline



| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|-------|--------|-------|
| | MIN | MAX | MIN | MAX |
| A | - | 1.750 | - | 0.069 |
| A1 | 0.100 | - | 0.004 | - |
| A2 | 1.250 | 1.650 | 0.049 | 0.065 |
| b | 0.360 | 0.510 | 0.014 | 0.020 |
| c | 0.190 | 0.250 | 0.007 | 0.010 |
| D | 4.800 | 5.000 | 0.189 | 0.197 |
| E | 5.800 | 6.200 | 0.228 | 0.244 |
| E1 | 3.800 | 4.000 | 0.150 | 0.157 |
| e | 1.270 | | 0.050 | |
| N | 8 | | 8 | |
| L | 0.390 | 0.890 | 0.015 | 0.035 |
| h | 0.250 | 0.410 | 0.010 | 0.016 |
| e | 0° | 8° | 0° | 8° |
| ccc | 0.100 | | 0.004 | |
| ddd | 0.200 | | 0.008 | |
| F1 | 5.590 | 5.790 | 0.220 | 0.228 |
| F2 | 0.550 | 0.750 | 0.022 | 0.030 |
| F3 | 1.210 | 1.410 | 0.048 | 0.056 |

REFERENCE
JEDEC / MS-012

SCALE
0 1.0 2mm

EUROPEAN PROJECTION

ISSUE DATE
19-09-2005

FILE
DSO-8_1

Dimensions in mm



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