

OptiMOS™ 2 + OptiMOS™-P 2 Small Signal Transistor

Features

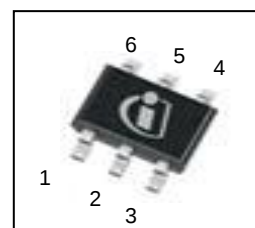
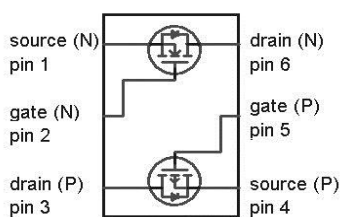
- Complementary P + N channel
- Enhancement mode
- Super Logic level (2.5V rated)
- Avalanche rated
- Qualified according to AEC Q101
- 100% lead-free; RoHS compliant
- Halogen-free according to IEC61249-2-21



Product Summary

		P	N	
V_{DS}		-20	20	V
$R_{DS(on),max}$	$V_{GS}=\pm 4.5\text{ V}$	1200	350	$m\Omega$
	$V_{GS}=\pm 2.5\text{ V}$	2100	600	
I_D		-0.53	0.95	A

PG-SOT-363



Type	Package	Tape and Reel Information	Marking	Lead Free	Packing
BSD235C	PG-SOT-363	H6327: 3000 pcs / reel	X9s	Yes	Non dry

Maximum ratings, at $T_j=25\text{ }^{\circ}\text{C}$, unless otherwise specified ¹⁾

Parameter	Symbol	Conditions	Value		Unit
			P	N	
Continuous drain current	I_D	$T_A=25\text{ }^{\circ}\text{C}$	-0.53	0.95	A
		$T_A=70\text{ }^{\circ}\text{C}$	-0.46	0.76	
Pulsed drain current	$I_{D,pulse}$	$T_A=25\text{ }^{\circ}\text{C}$	-2.1	3.8	
Avalanche energy, single pulse	E_{AS}	P: $I_D=-0.53\text{ A}$, N: $I_D=0.95\text{ A}$, $R_{GS}=25\text{ }\Omega$	1.4	1.6	mJ
Gate source voltage	V_{GS}		± 12		V
Power dissipation	P_{tot}	$T_A=25\text{ }^{\circ}\text{C}$	0.5		W
Operating and storage temperature	T_j, T_{stg}		-55 ... 150		$^{\circ}\text{C}$
ESD class		JESD22-A114-HBM	0 (<250V)		$^{\circ}\text{C}$
Soldering temperature	T_{solder}		260		$^{\circ}\text{C}$
IEC climatic category; DIN IEC 68-1			55/150/56		

¹⁾ Remark: only one of both transistors active

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Thermal characteristics

Thermal resistance, junction - ambient	P	R_{thJA}	minimal footprint ²⁾	-	-	250	K/W
	N						

Electrical characteristics, at $T_j=25\text{ °C}$, unless otherwise specified
Static characteristics

Drain-source breakdown voltage	P	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}, I_D=-250\text{ }\mu\text{A}$	-	-	-20	V
	N		$V_{GS}=0\text{ V}, I_D=250\text{ }\mu\text{A}$	20	-	-	
Gate threshold voltage	P	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-1.5\text{ }\mu\text{A}$	-1.2	-0.9	-0.6	
	N		$V_{DS}=V_{GS}, I_D=1.6\text{ }\mu\text{A}$	0.7	0.95	1.2	
Zero gate voltage drain current	P	I_{DSS}	$V_{DS}=-20\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$	-	-	-1	μA
	N		$V_{DS}=20\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$	-	-	1	
	P		$V_{DS}=-20\text{ V}, V_{GS}=0\text{ V}, T_j=150\text{ °C}$	-	-	-100	
	N		$V_{DS}=20\text{ V}, V_{GS}=0\text{ V}, T_j=150\text{ °C}$	-	-	100	
Gate-source leakage current	P	I_{GSS}	$V_{GS}=\pm 12\text{ V}, V_{DS}=0\text{ V}$	-	-	± 100	nA
	N						
Drain-source on-state resistance	P	$R_{DS(on)}$	$V_{GS}=-2.5\text{ V}, I_D=-0.17\text{ A}$	-	1221	2100	m Ω
	N		$V_{GS}=2.5\text{ V}, I_D=0.29\text{ A}$	-	415	600	
	P		$V_{GS}=-4.5\text{ V}, I_D=-0.53\text{ A}$	-	745	1200	
	N		$V_{GS}=4.5\text{ V}, I_D=0.95\text{ A}$	-	266	350	
Transconductance	P	g_{fs}	$ V_{DS} >2 I_D R_{DS(on)max}, I_D=-0.46\text{ A}$	-	0.7	-	S
	N		$ V_{DS} >2 I_D R_{DS(on)max}, I_D=0.76\text{ A}$	-	2	-	

²⁾ Performed on 40mm² FR4 PCB. The traces are 1mm wide, 70 μm thick and 20mm long; they are present on both sides of the PCB

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Dynamic characteristics

Input capacitance	P	C_{iss}	$V_{GS}=0\text{ V}$, P: $V_{DS}=-10\text{ V}$, N: $V_{DS}=10\text{ V}$, $f=1\text{ MHz}$	-	37	-	pF
	N			-	47	-	
Output capacitance	P	C_{oss}		-	17	-	
	N			-	24	-	
Reverse transfer capacitance	P	C_{rss}		-	14	-	
	N			-	3	-	
Turn-on delay time	P	$t_{d(on)}$	P: $V_{DD}=-10\text{ V}$, $V_{GS}=-4.5\text{ V}$, $R_G=6\ \Omega$, $I_D=-0.53\text{ A}$ N: $V_{DD}=10\text{ V}$, $V_{GS}=4.5\text{ V}$, $R_G=6\ \Omega$, $I_D=0.95\text{ A}$	-	3.8	-	ns
	N			-	3.8	-	
Rise time	P	t_r		-	5.0	-	
	N			-	3.6	-	
Turn-off delay time	P	$t_{d(off)}$		-	5.1	-	
	N			-	4.5	-	
Fall time	P	t_f		-	3.2	-	
	N			-	1.2	-	

Gate Charge Characteristics

Gate to source charge	P	Q_{gs}	$V_{DD}=-10\text{ V}$, $I_D=-0.53\text{ A}$, $V_{GS}=0\text{ to }-4.5\text{ V}$	-	-0.09	-	nC
Gate to drain charge		Q_{gd}		-	-0.2	-	
Switching charge		Q_g		-	-0.4	-	
Gate plateau voltage		$V_{plateau}$		-	-2.4	-	
Gate to source charge	N	Q_{gs}	$V_{DD}=16\text{ V}$, $I_D=0.95\text{ A}$, $V_{GS}=0\text{ to }4.5\text{ V}$	-	0.11	-	
Gate to drain charge		Q_{gd}		-	0.09	-	
Switching charge		Q_g		-	0.34	-	
Gate plateau voltage		$V_{plateau}$		-	2.4	-	

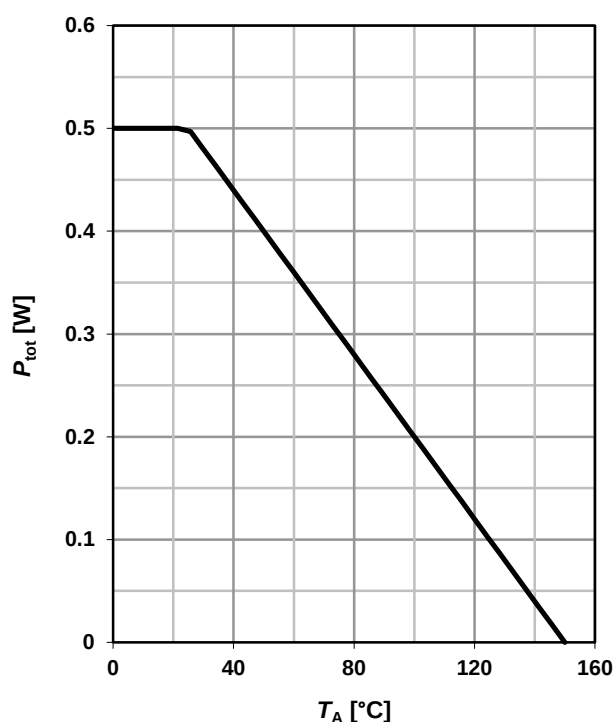
Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Reverse Diode

Diode continuous forward current	P	I_S	$T_C=25\text{ }^{\circ}\text{C}$	-	-	-0.42	A
	N					0.5	
Diode pulse current	P	$I_{S,pulse}$		-	-	-2.1	
	N			-	-	3.8	
Diode forward voltage	P	V_{SD}	$V_{GS}=0\text{ V}, I_F=-0.53\text{ A},$ $T_j=25\text{ }^{\circ}\text{C}$	-	-1	-1.2	V
	N		$V_{GS}=0\text{ V}, I_F=0.95\text{ A},$ $T_j=25\text{ }^{\circ}\text{C}$	-	0.9	1.1	
Reverse recovery time	P	t_{rr}	$V_R=\pm 10\text{ V}, I_F=I_S,$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	7.6	-	ns
	N			-	5.2	-	
Reverse recovery charge	P	Q_{rr}		-	1.1	-	nC
	N			-	0.97	-	

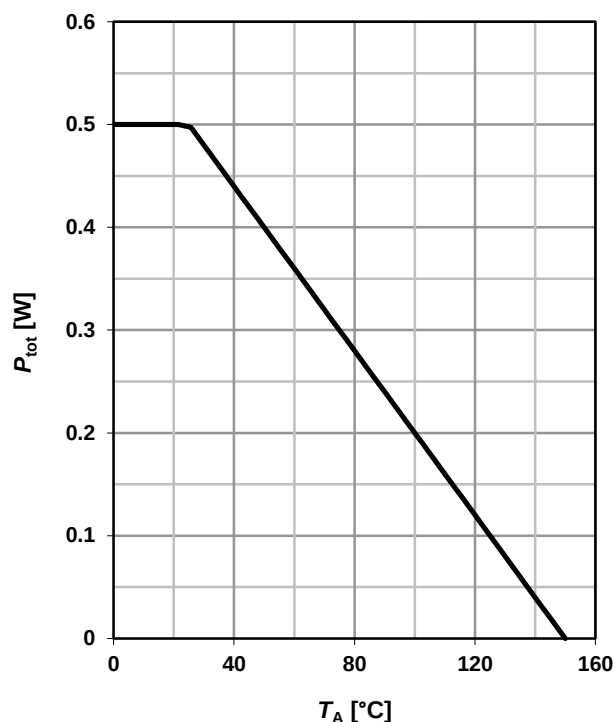
1 Power dissipation (P)

$$P_{\text{tot}} = f(T_A)$$



2 Power dissipation (N)

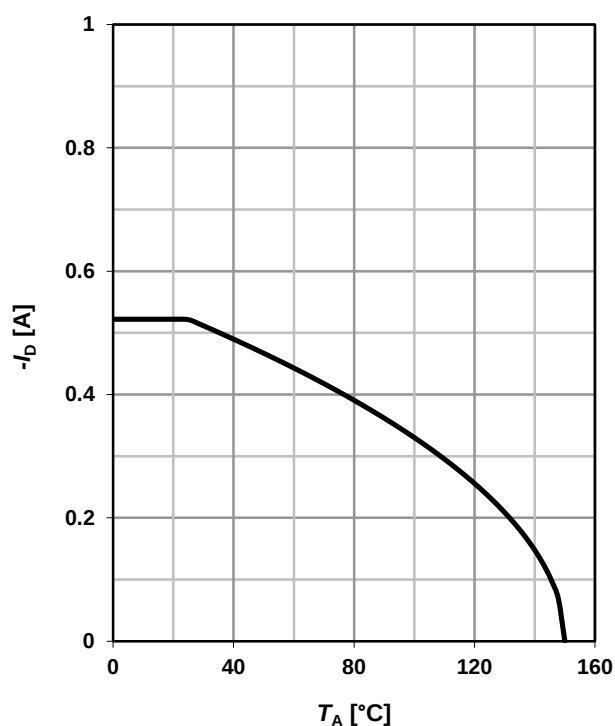
$$P_{\text{tot}} = f(T_A)$$



3 Drain current (P)

$$I_D = f(T_A)$$

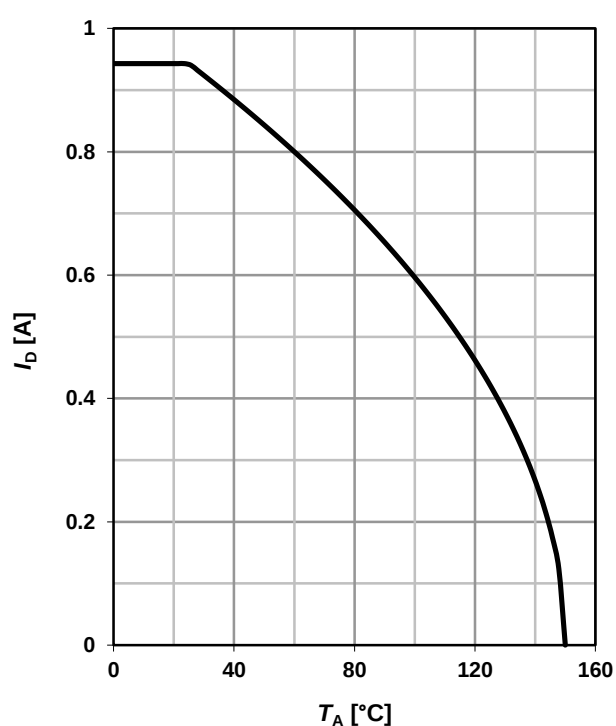
parameter: $V_{GS} \leq 4.5$ V



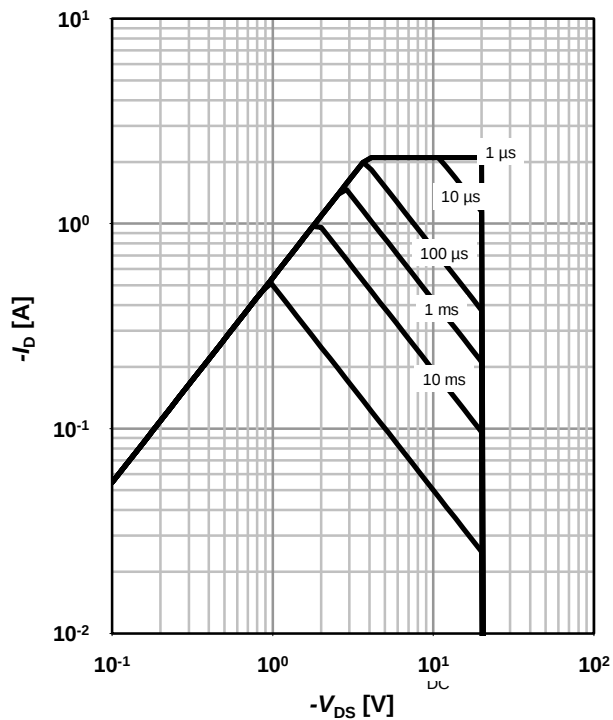
4 Drain current (N)

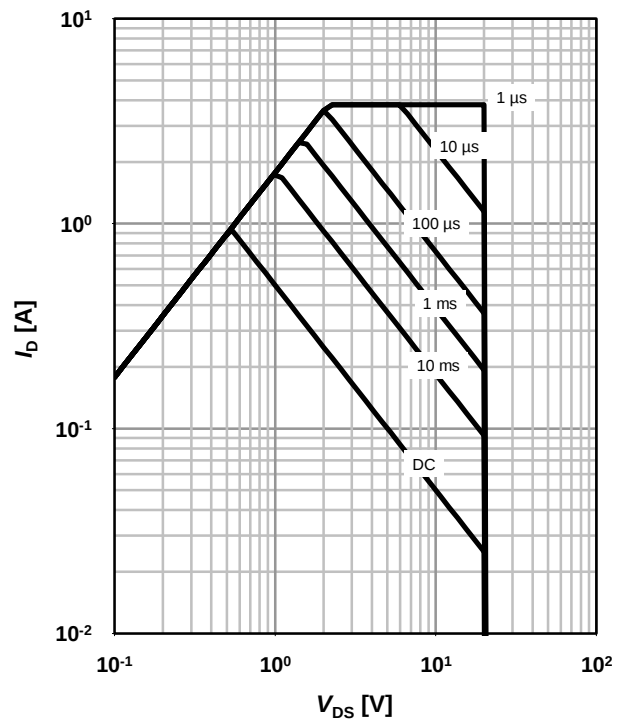
$$I_D = f(T_A)$$

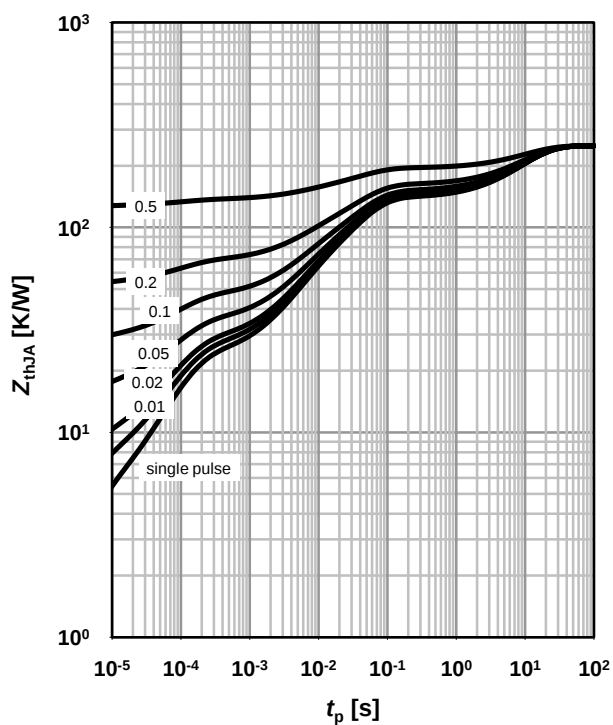
parameter: $V_{GS} \geq 4.5$ V

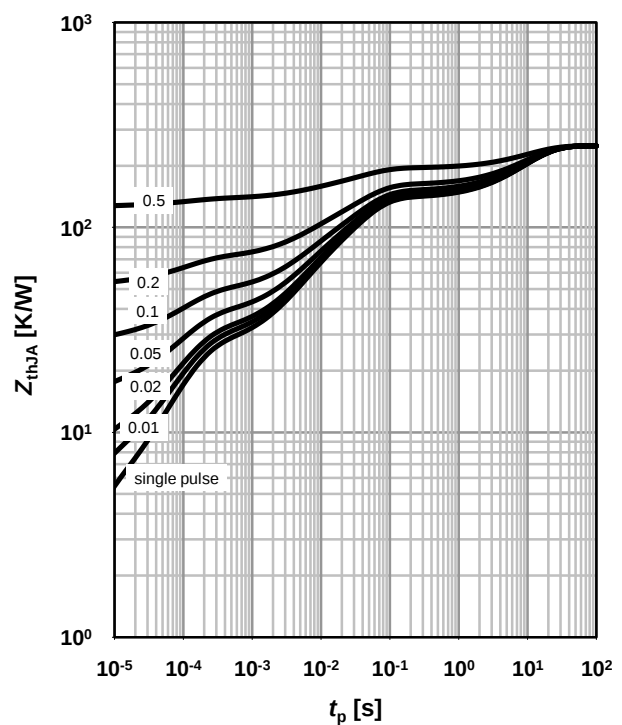


5 Safe operating area (P)
 $I_D = f(V_{DS}); T_A = 25\text{ }^\circ\text{C}; D = 0$

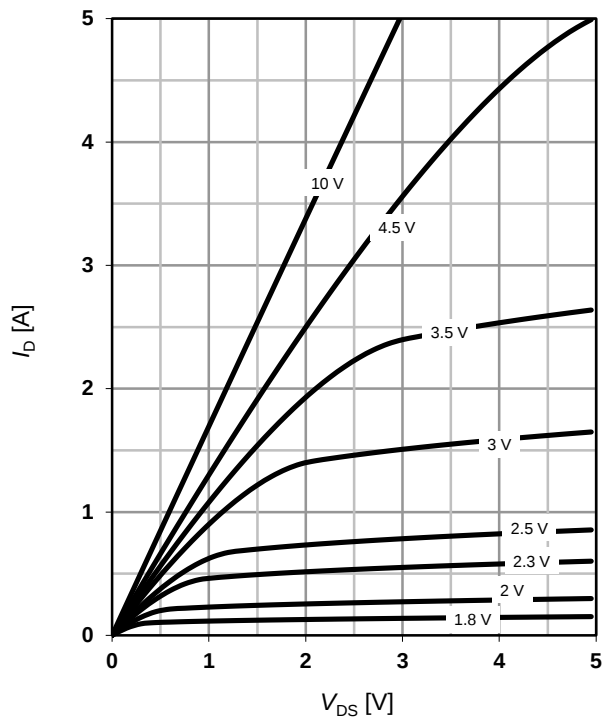
parameter: t_p

6 Safe operating area (N)
 $I_D = f(V_{DS}); T_A = 25\text{ }^\circ\text{C}; D = 0$

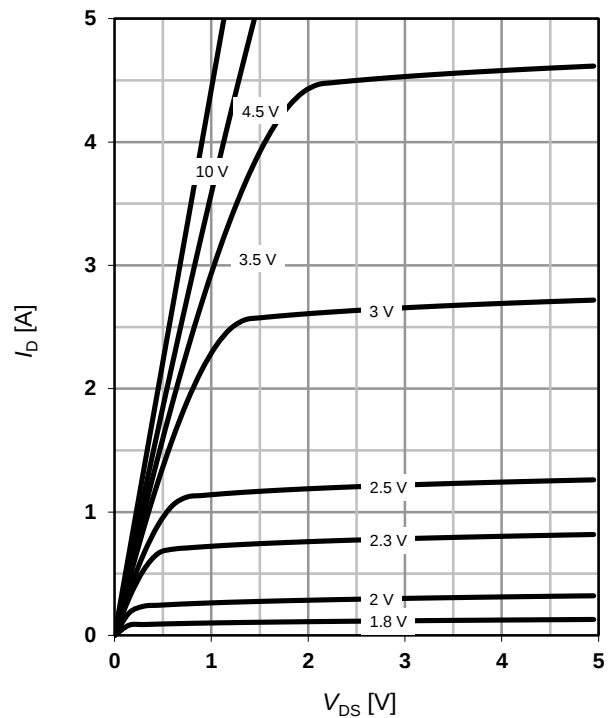
parameter: t_p

7 Max. transient thermal impedance (P)
 $Z_{thJA} = f(t_p)$

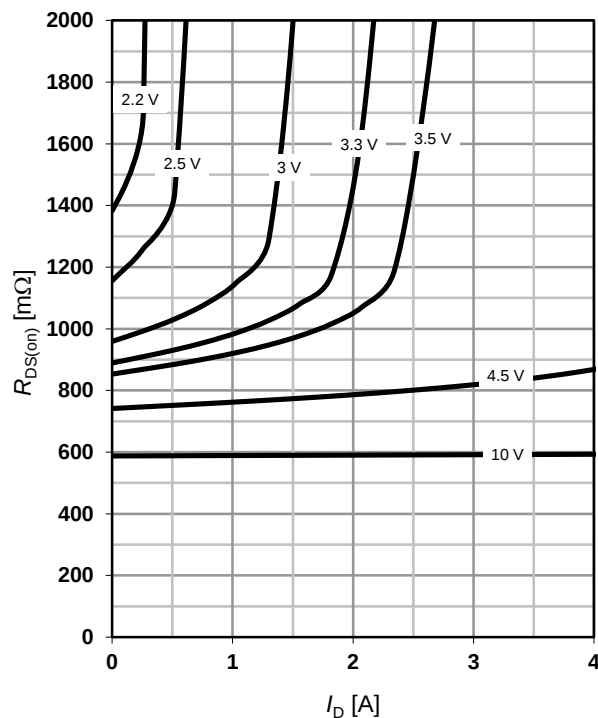
parameter: $D = t_p/T$

8 Max. transient thermal impedance (N)
 $Z_{thJA} = f(t_p)$

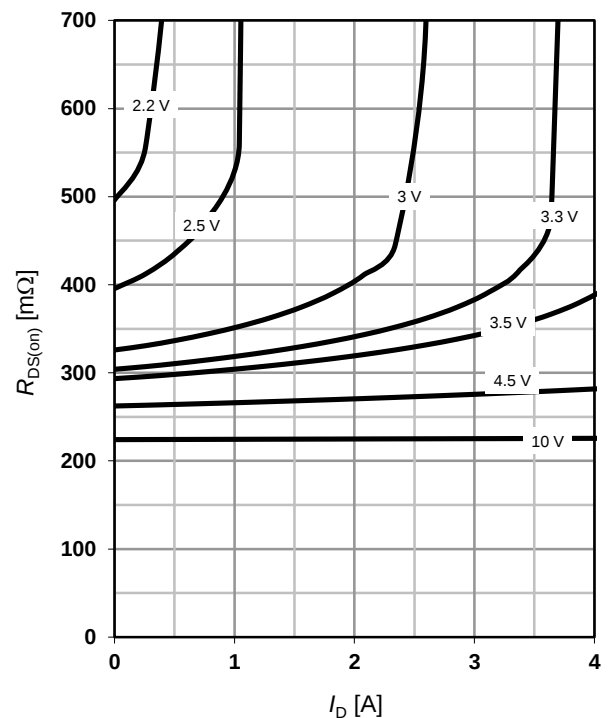
parameter: $D = t_p/T$


9 Typ. output characteristics (P)
 $I_D = f(V_{DS}); T_j = 25^\circ\text{C}$

parameter: V_{GS}

10 Typ. output characteristics (N)
 $I_D = f(V_{DS}); T_j = 25^\circ\text{C}$

parameter: V_{GS}

11 Typ. drain-source on resistance (P)
 $R_{DS(on)} = f(I_D); T_j = 25^\circ\text{C}$

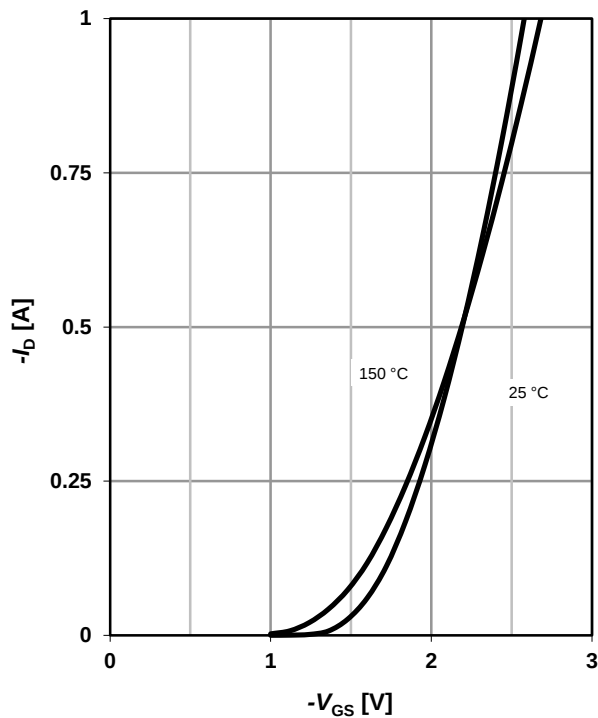
parameter: V_{GS}

12 Typ. drain-source on resistance (N)
 $R_{DS(on)} = f(I_D); T_j = 25^\circ\text{C}$

parameter: V_{GS}


13 Typ. transfer characteristics (P)

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

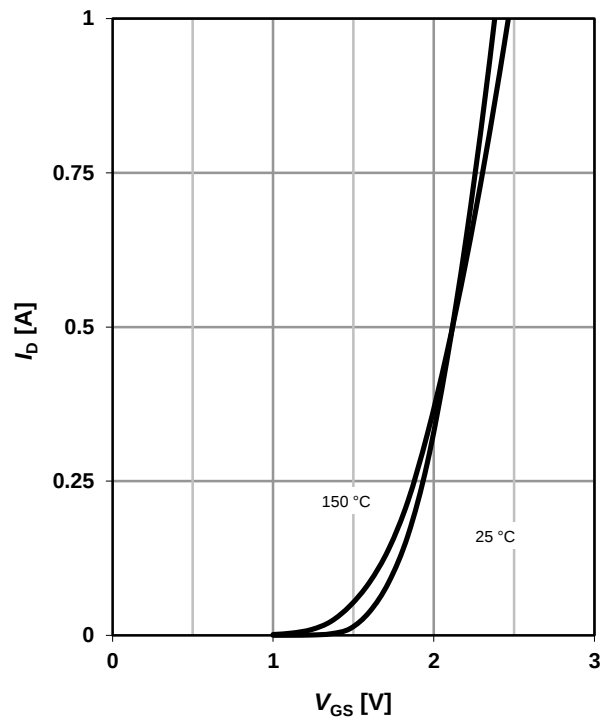
parameter: T_j



14 Typ. transfer characteristics (N)

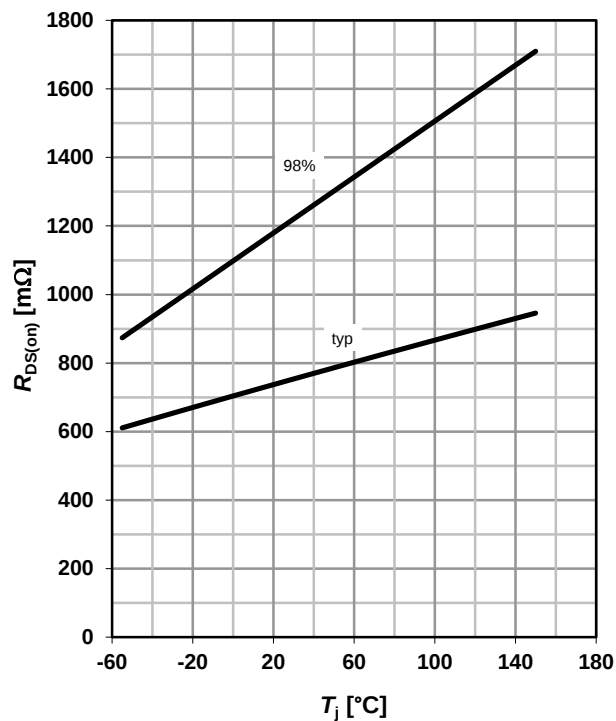
$I_D = f(V_{GS}); |V_{DS}| > 2 |I_D| R_{DS(on)max}$

parameter: T_j



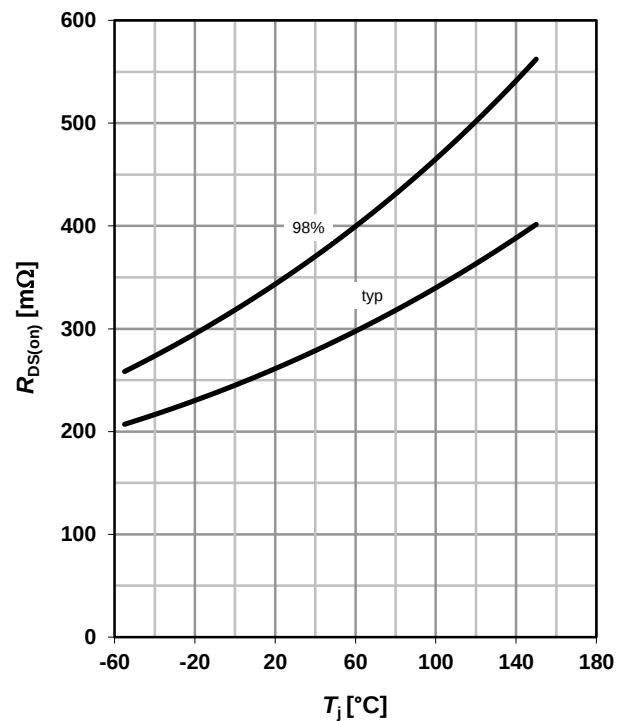
15 Drain-source on-state resistance (P)

$R_{DS(on)} = f(T_j); I_D = -0.53 \text{ A}; V_{GS} = -4.5 \text{ V}$



16 Drain-source on-state resistance (N)

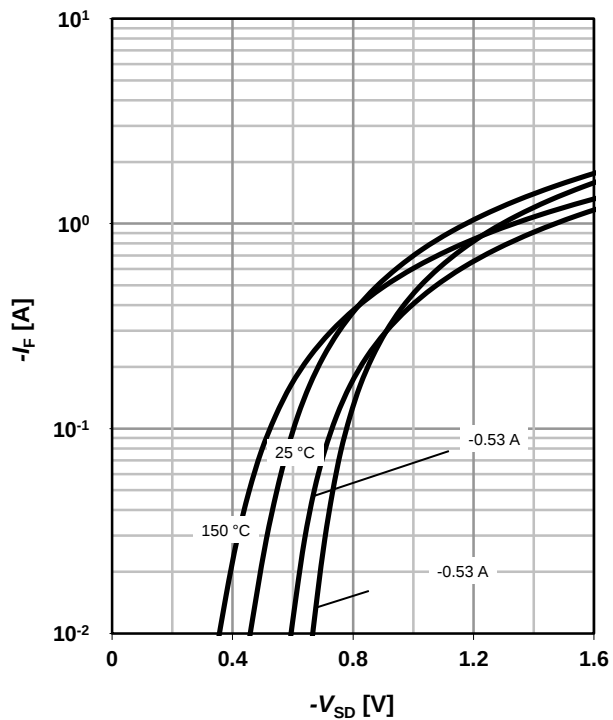
$R_{DS(on)} = f(T_j); I_D = 0.95 \text{ A}; V_{GS} = 4.5 \text{ V}$



21 Forward characteristics of reverse diode (P)

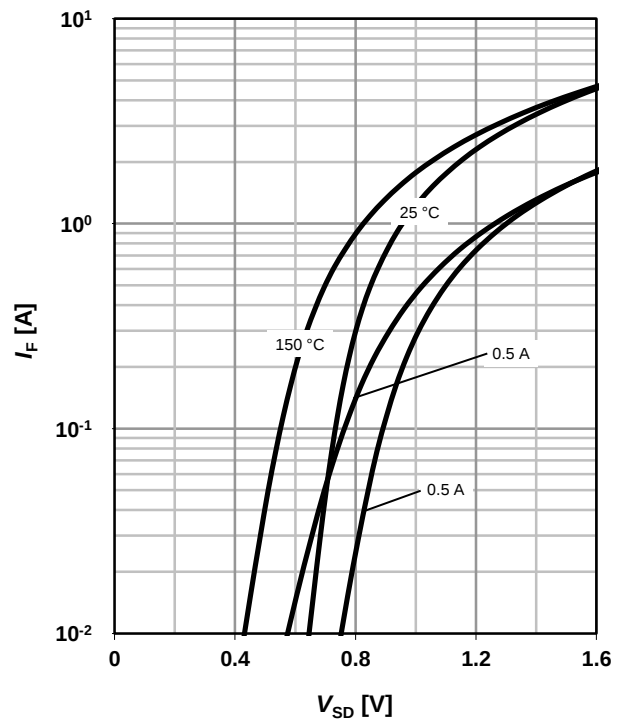
$$I_F = f(V_{SD})$$

parameter: T_j


22 Forward characteristics of reverse diode (N)

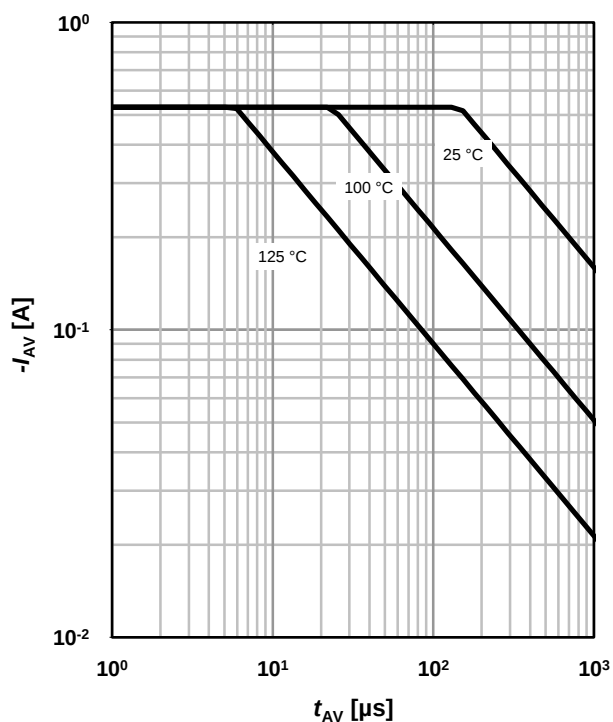
$$I_F = f(V_{SD})$$

parameter: T_j


23 Avalanche characteristics (P)

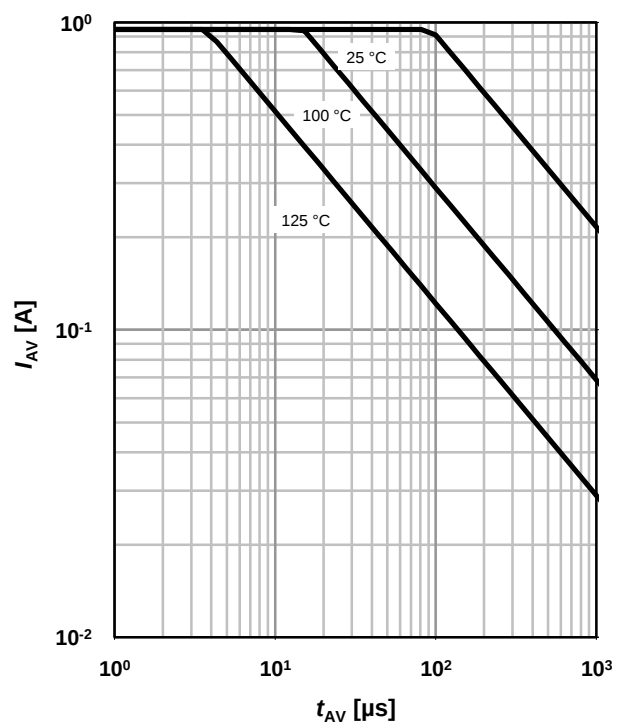
$$I_{AS} = f(t_{AV}); R_{GS} = 25 \Omega$$

parameter: $T_{j(start)}$


24 Avalanche characteristics (N)

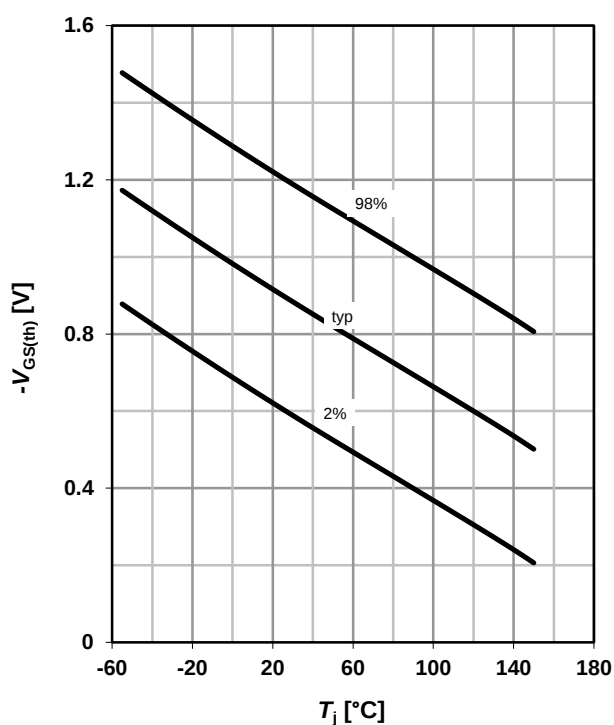
$$I_{AS} = f(t_{AV}); R_{GS} = 25 \Omega$$

parameter: $T_{j(start)}$



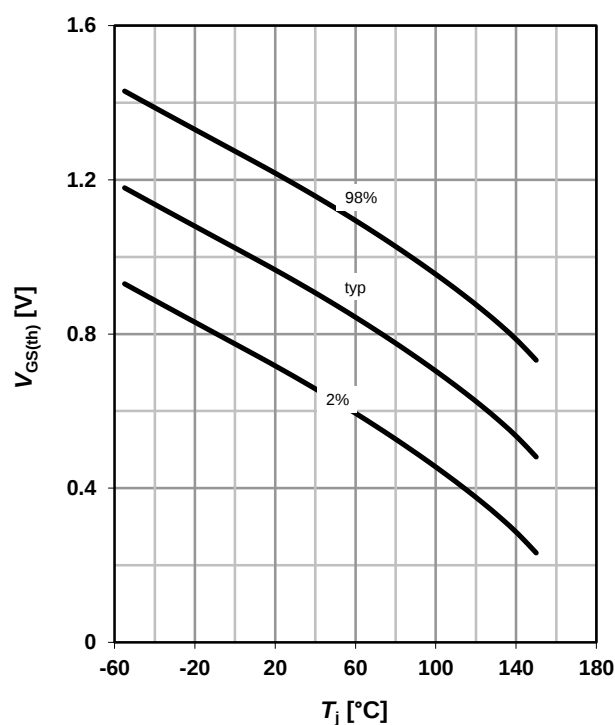
17 Typ. gate threshold voltage (P)

$V_{GS(th)}=f(T_j)$; $V_{GS}=V_{DS}$; $I_D=-1.5\ \mu A$



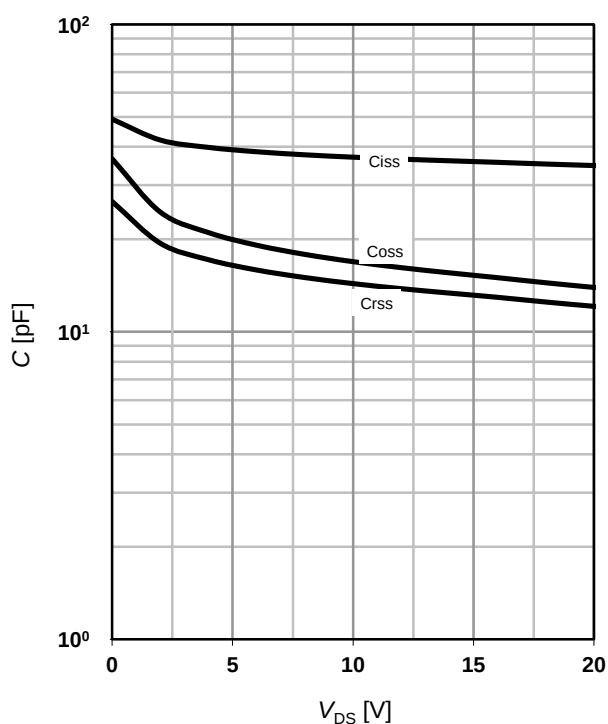
18 Typ. gate threshold voltage (N)

$V_{GS(th)}=f(T_j)$; $V_{GS}=V_{DS}$; $I_D=1.6\ \mu A$



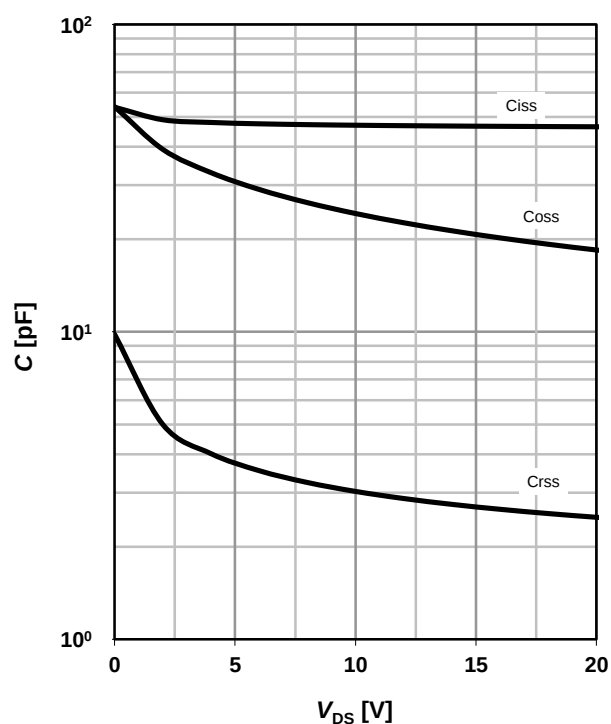
19 Typ. capacitances (P)

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

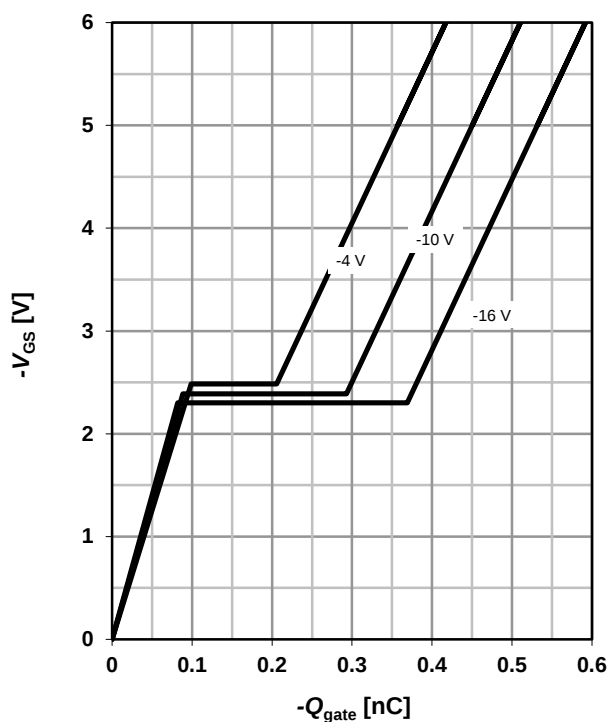


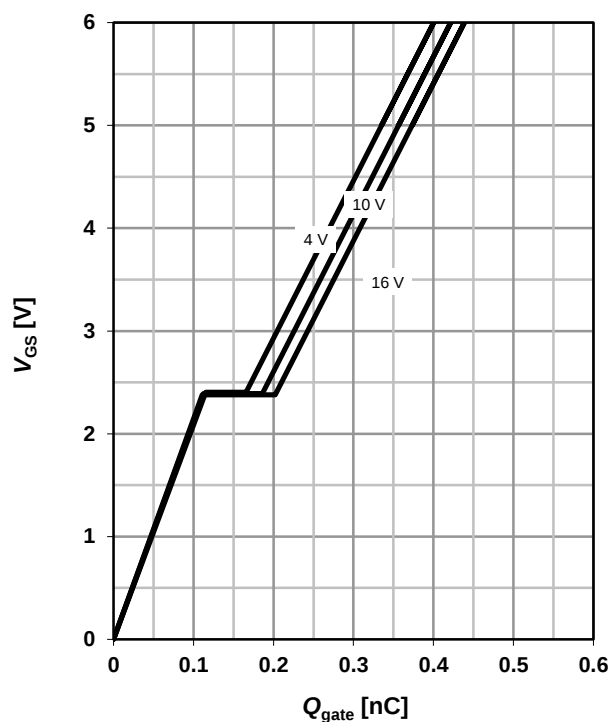
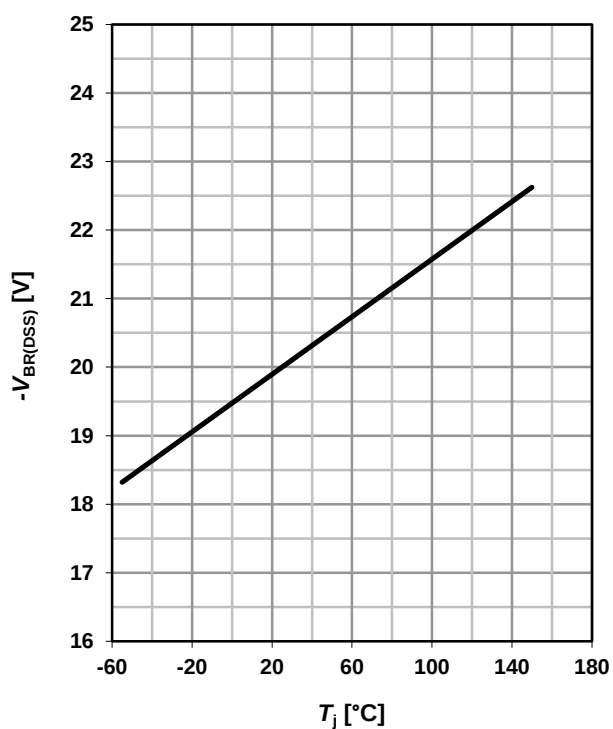
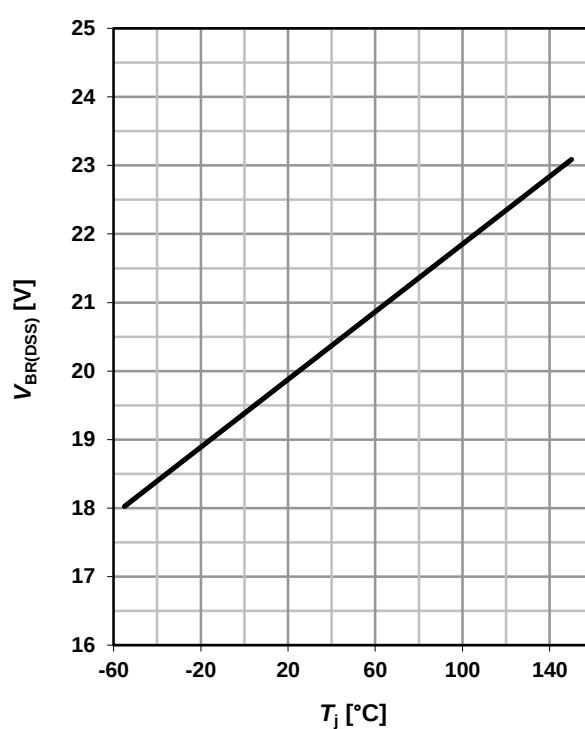
20 Typ. capacitances (N)

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



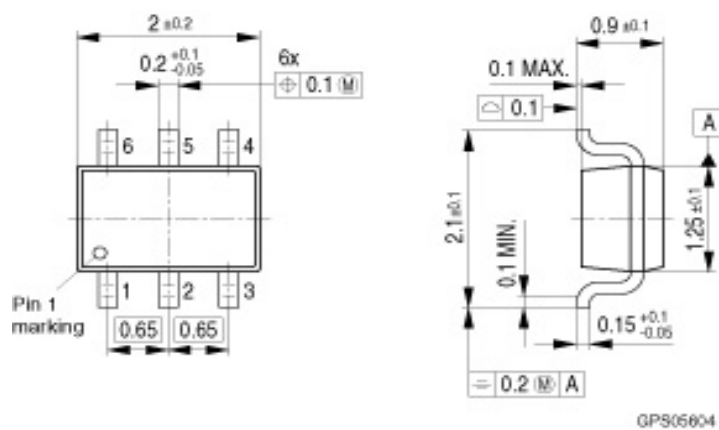
25 Typ. gate charge (P)
 $V_{GS}=f(Q_{gate}); I_D=-0.53 \text{ A pulsed}$

parameter: V_{DD}

26 Typ. gate charge (N)
 $V_{GS}=f(Q_{gate}); I_D=0.95 \text{ A pulsed}$

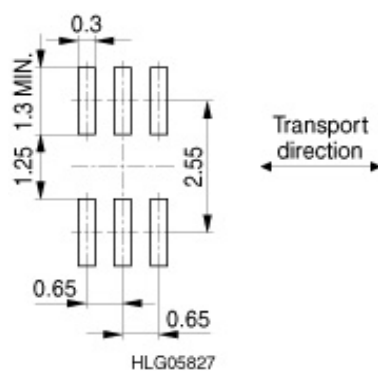
parameter: V_{DD}

27 Drain-source breakdown voltage (P)
 $V_{BR(DSS)}=f(T_j); I_D=-250 \mu\text{A}$

28 Drain-source breakdown voltage (N)
 $V_{BR(DSS)}=f(T_j); I_D=250 \mu\text{A}$


SOT-363

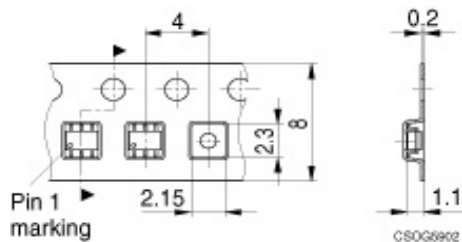
Package Outline:



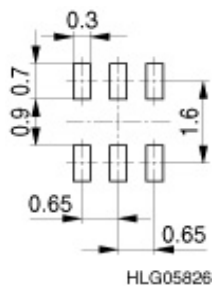
Footprint:



Packing:



Reflow soldering:



Dimensions in mm

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