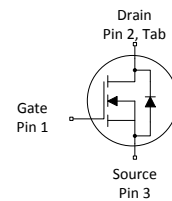
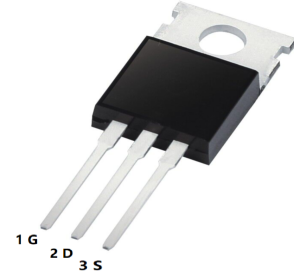


Features

- Very low on-resistance $R_{DS(on)}$
- 175 °C operating temperature
- Pb-free lead plating; RoHS compliant
- Ideal for high-frequency switching and synchronous rectification
- $V_{DS} = 100V$
- $I_D = 137A$
- $R_{DS(ON)}$ (at $V_{GS} = 10V$) $< 4.5m\Omega$



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

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous drain current	I_D			137 105	A	$T_C = 25\text{ °C}^{(1)}$ $T_C = 100\text{ °C}$
Pulsed drain current ⁽¹⁾	$I_{D,pulse}$			548	A	$T_C = 25\text{ °C}$
Avalanche energy, single pulse	E_{AS}			340	mJ	$I_D = 100\text{ A}$, $R_{GS} = 25\text{ }\Omega$
Gate source voltage	V_{GS}	-20		20	V	
Power dissipation	P_{tot}			214	W	$T_C = 25\text{ °C}$
Operating and storage temperature	T_j , T_{stg}	-55		175	°C	IEC climatic category; DIN IEC 68-1: 55/175/56

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}			0.7	K/W	
Thermal resistance, junction - ambient, minimal footprint	R_{thJA}			62	K/W	
Thermal resistance, junction - ambient, 6 cm ² cooling area ²⁾	R_{thJA}			50	K/W	
Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	100			V	$V_{GS}=0\text{ V}, I_D=1\text{ mA}$
Gate threshold voltage	$V_{GS(th)}$	2	2.7	3.5	V	$V_{DS}=V_{GS}, I_D=150\text{ }\mu\text{A}$
Zero gate voltage drain current	I_{DSS}		0.1 10	1 100	μA	$V_{DS}=100\text{ V}, V_{GS}=0\text{ V}, T_J=25\text{ }^\circ\text{C}$ $V_{DS}=100\text{ V}, V_{GS}=0\text{ V}, T_J=125\text{ }^\circ\text{C}$
Gate-source leakage current	I_{GSS}		1	100	nA	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$		3.9 4.7	4.5 7.7	m Ω	$V_{GS}=10\text{ V}, I_D=100\text{ A}$ $V_{GS}=6\text{ V}, I_D=50\text{ A}$
Gate resistance	R_G		1.4		Ω	
Transconductance	g_{fs}	73	145		S	$ V_{DS} >2 I_D R_{DS(on)max}, I_D=100\text{ A}$

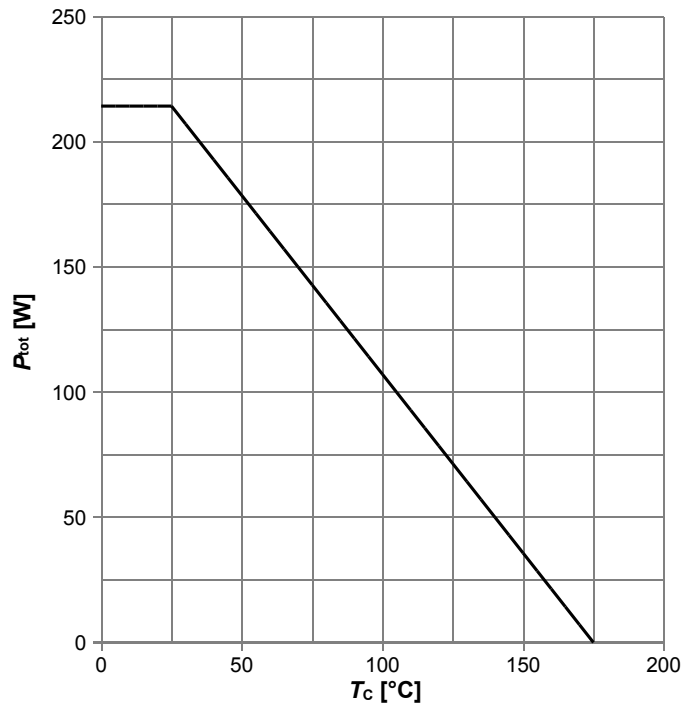
¹⁾ See Diagram 3

²⁾ Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm² (one layer, 70 μm thick) copper area for drain connection. PCB is vertical in still air.

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}		6320	8410	pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=1\text{ MHz}$
Output capacitance	C_{oss}		1210	1610	pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=1\text{ MHz}$
Reverse transfer capacitance	C_{rss}		41		pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=1\text{ MHz}$
Turn-on delay time	$t_{d(on)}$		27		ns	$V_{DD}=50\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=50\text{ A}$, $R_G=1.6\ \Omega$
Rise time	t_r		59		ns	$V_{DD}=50\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=50\text{ A}$, $R_G=1.6\ \Omega$
Turn-off delay time	$t_{d(off)}$		48		ns	$V_{DD}=50\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=50\text{ A}$, $R_G=1.6\ \Omega$
tFall time	t_f		14		ns	$V_{DD}=50\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=50\text{ A}$, $R_G=1.6\ \Omega$
Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}		30	39	nC	$V_{DD}=50\text{ V}$, $I_D=100\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate to drain charge	Q_{gd}		16		nC	$V_{DD}=50\text{ V}$, $I_D=100\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Switching charge	Q_{sw}		27		nC	$V_{DD}=50\text{ V}$, $I_D=100\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate charge total	Q_g		88	117	nC	$V_{DD}=50\text{ V}$, $I_D=100\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate plateau voltage	$V_{plateau}$		4.7		V	$V_{DD}=50\text{ V}$, $I_D=100\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Output charge	Q_{oss}		122	162	nC	$V_{DD}=50\text{ V}$, $V_{GS}=0\text{ V}$
Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S			137	A	$T_C=25\text{ }^\circ\text{C}$
Diode pulse current	$I_{S,pulse}$			548	A	$T_C=25\text{ }^\circ\text{C}$
Diode forward voltage	V_{SD}		1.0	1.2	V	$V_{GS}=0\text{ V}$, $I_F=100\text{ A}$, $T_J=25\text{ }^\circ\text{C}$
Reverse recovery time	t_{rr}		68		ns	$V_R=50\text{ V}$, $I_F=I_S$, $di_F/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}		135		nC	$V_R=50\text{ V}$, $I_F=I_S$, $di_F/dt=100\text{ A}/\mu\text{s}$

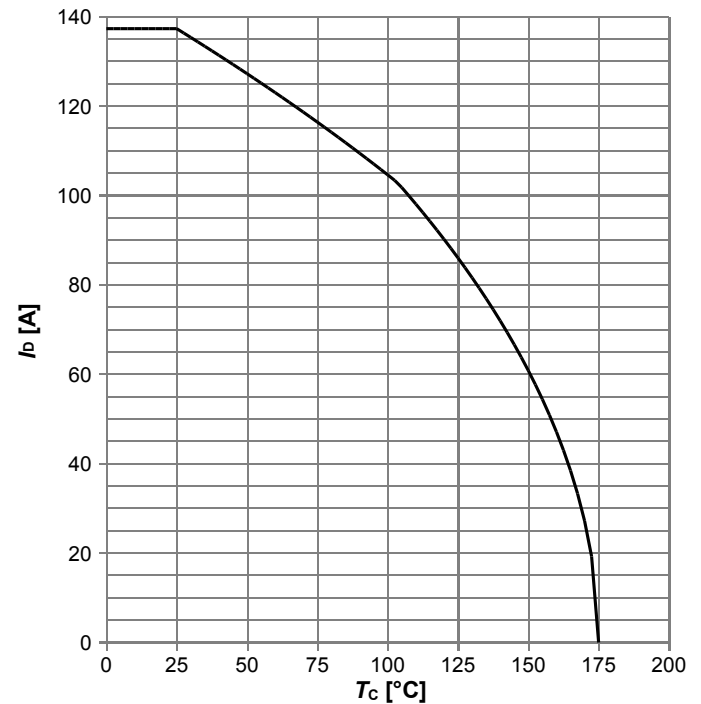
Electrical characteristics diagrams

Diagram 1: Power dissipation



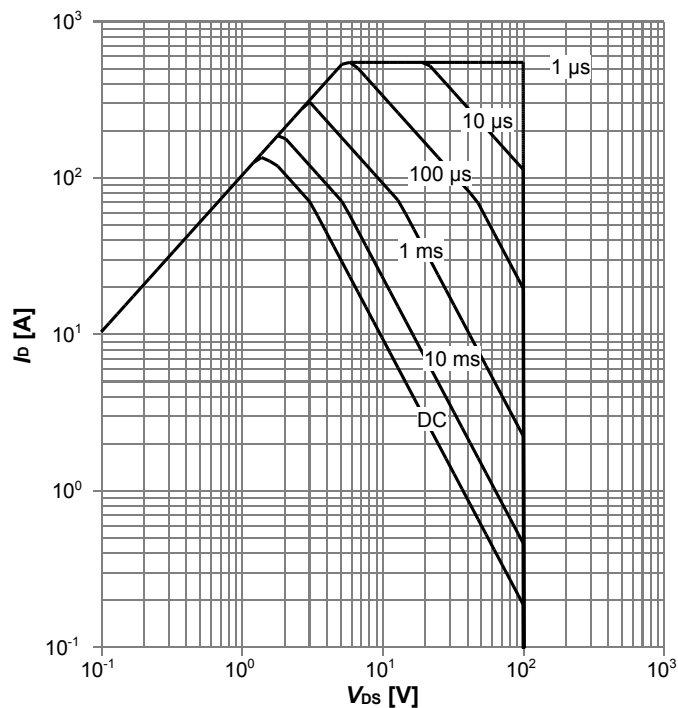
$$P_{tot}=f(T_c)$$

Diagram 2: Drain current



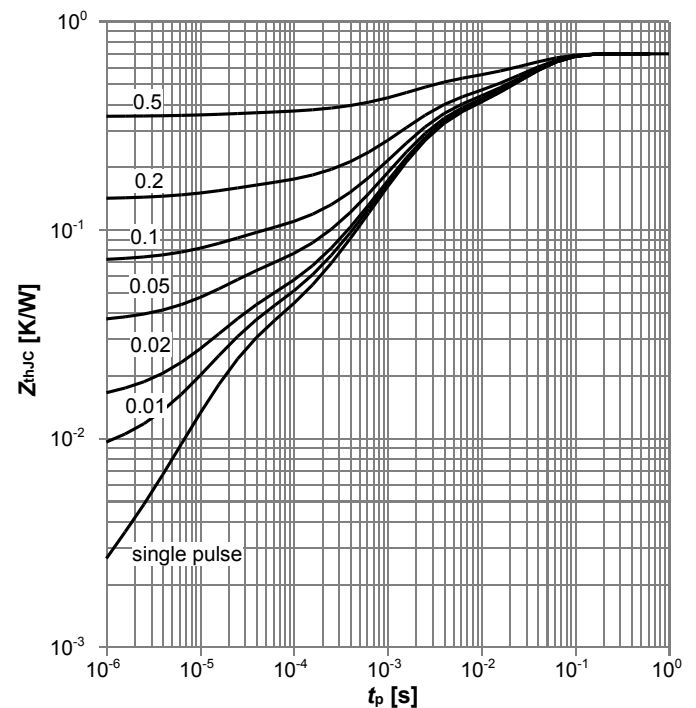
$$I_D=f(T_c); V_{GS}\geq 10\text{ V}$$

Diagram 3: Safe operating area



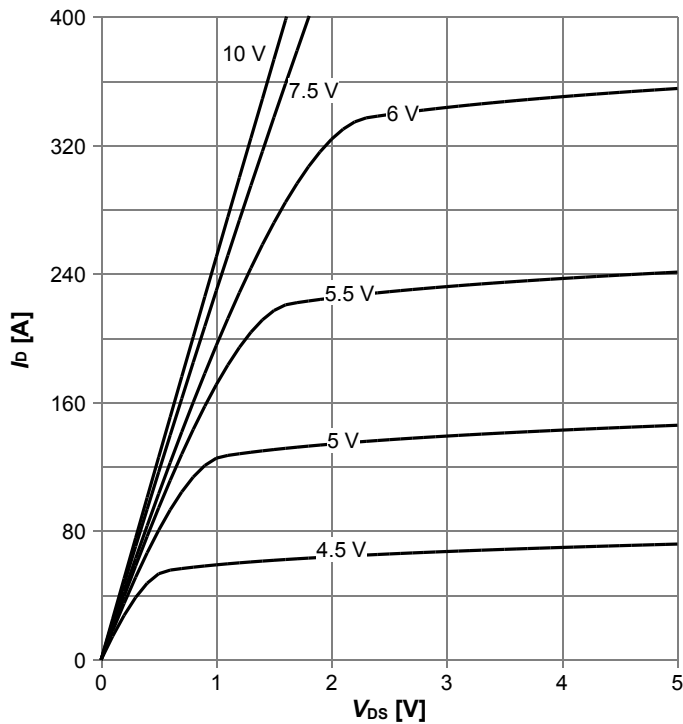
$$I_D=f(V_{DS}); T_c=25\text{ °C}; D=0; \text{parameter: } t_p$$

Diagram 4: Max. transient thermal impedance



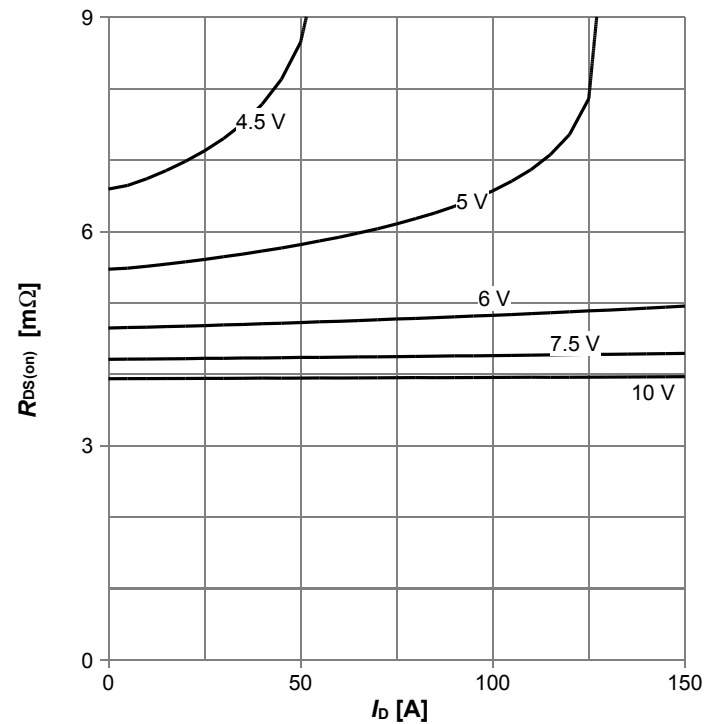
$$Z_{thJC}=f(t_p); \text{parameter: } D=t_p/T$$

Diagram 5: Typ. output characteristics



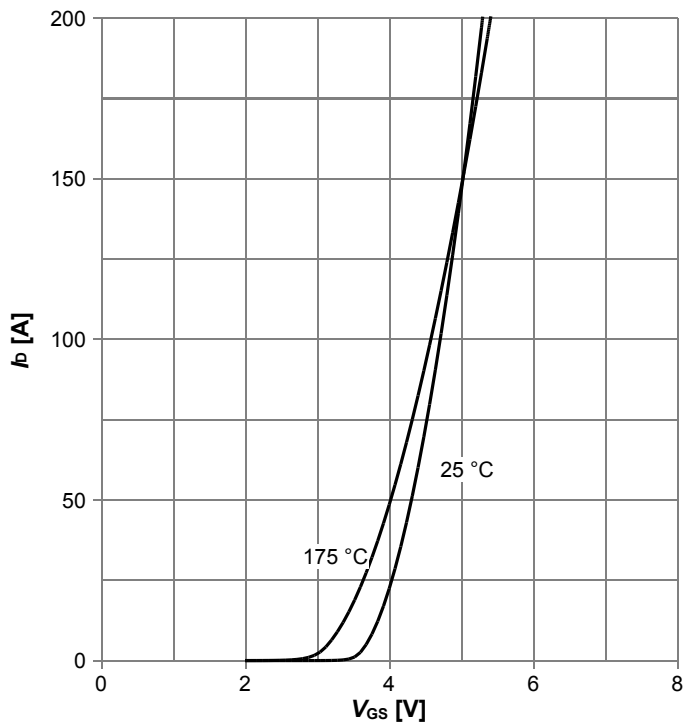
$I_D = f(V_{DS})$; $T_j = 25\text{ °C}$; parameter: V_{GS}

Diagram 6: Typ. drain-source on resistance



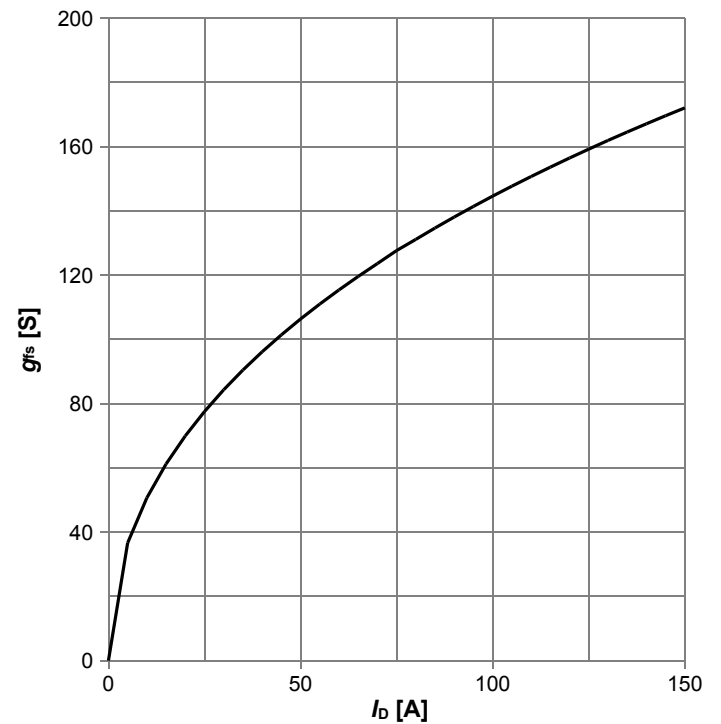
$R_{DS(on)} = f(I_D)$; $T_j = 25\text{ °C}$; parameter: V_{GS}

Diagram 7: Typ. transfer characteristics



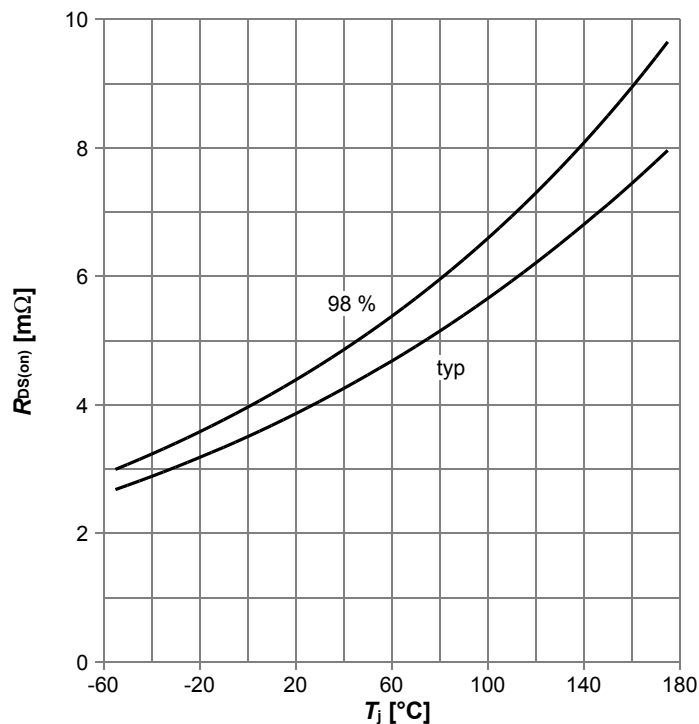
$I_D = f(V_{GS})$; $|V_{DS}| > 2|I_D|R_{DS(on)max}$; parameter: T_j

Diagram 8: Typ. forward transconductance



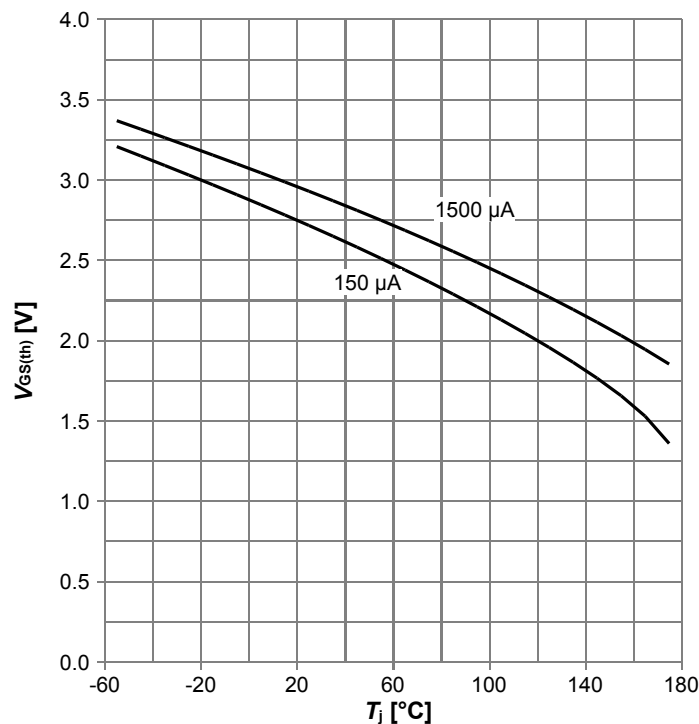
$g_{fs} = f(I_D)$; $T_j = 25\text{ °C}$

Diagram 9: Drain-source on-state resistance



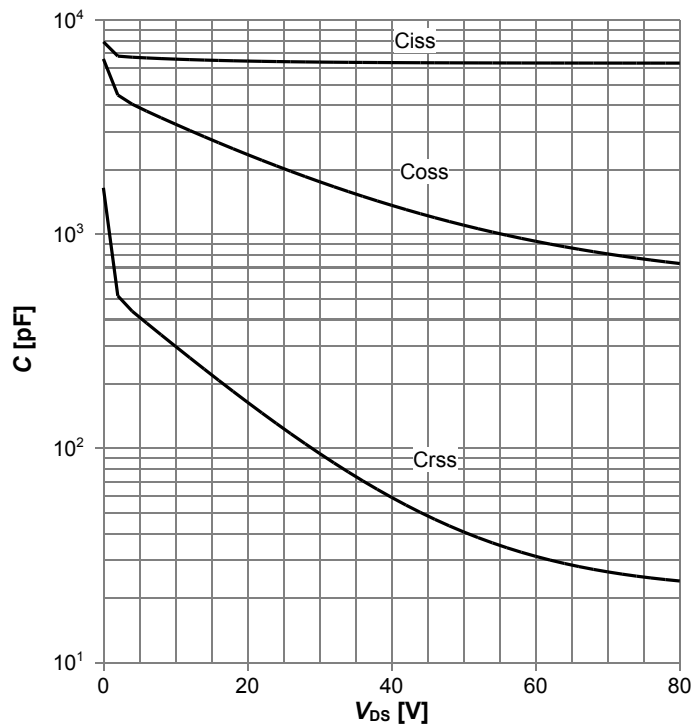
$R_{DS(on)} = f(T_j); I_D = 100 \text{ A}; V_{GS} = 10 \text{ V}$

Diagram 10: Typ. gate threshold voltage



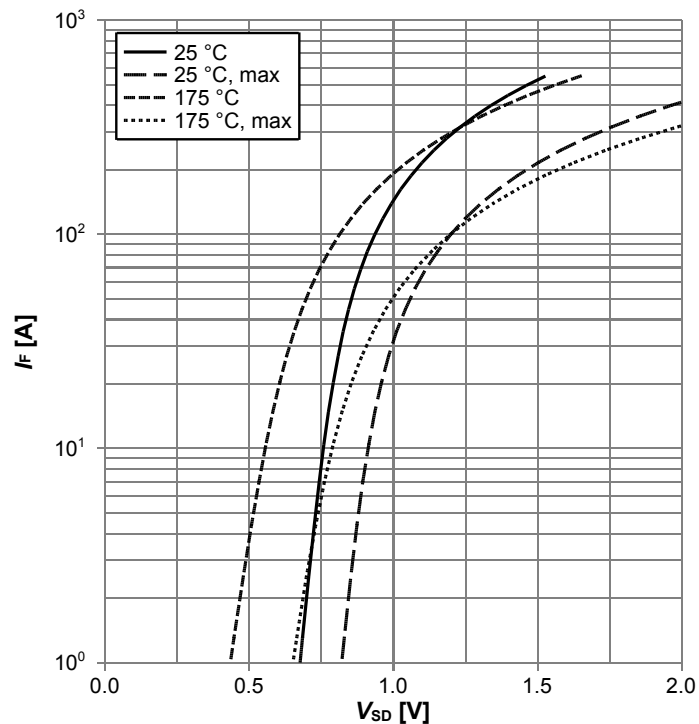
$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}; \text{parameter: } I_D$

Diagram 11: Typ. capacitances



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

Diagram 12: Forward characteristics of reverse diode



$I_F = f(V_{SD}); \text{parameter: } T_j$

Diagram 13: Avalanche characteristics

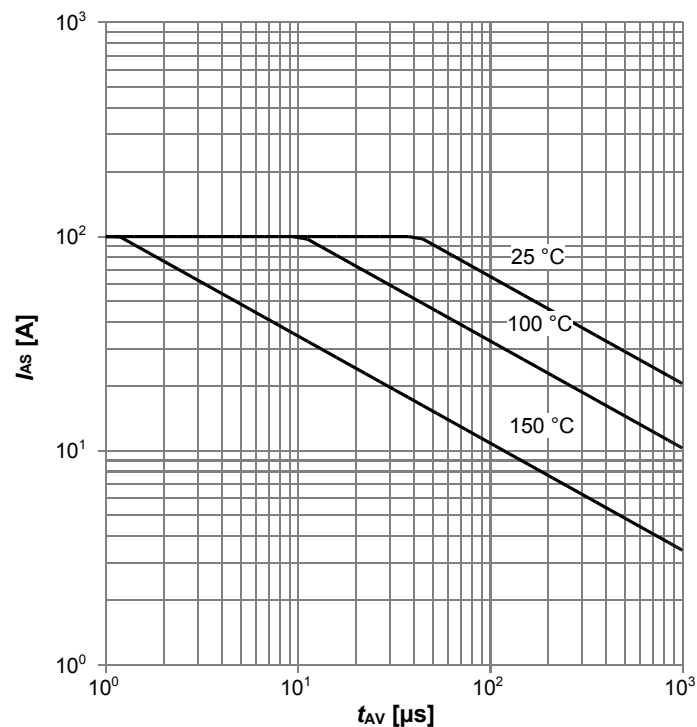


Diagram 14: Typ. gate charge

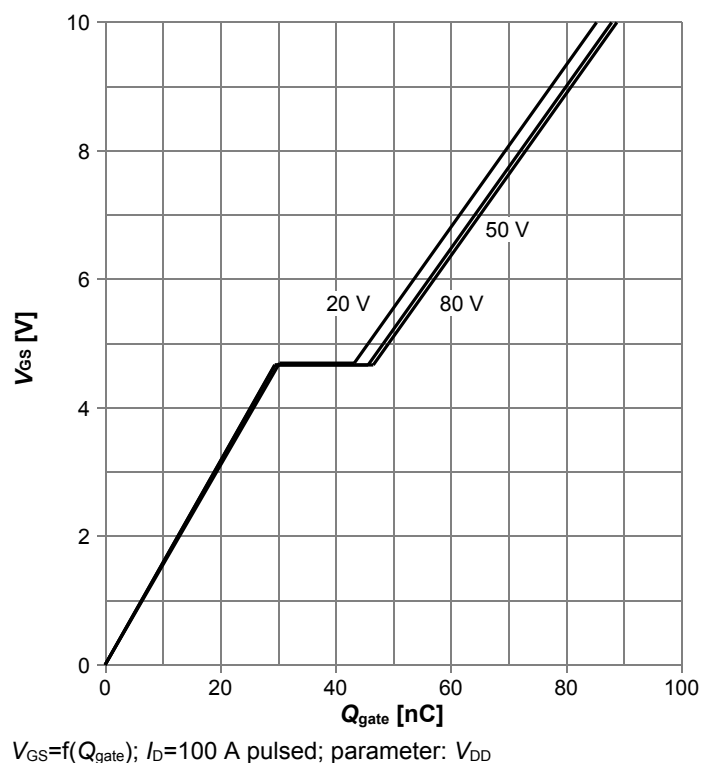
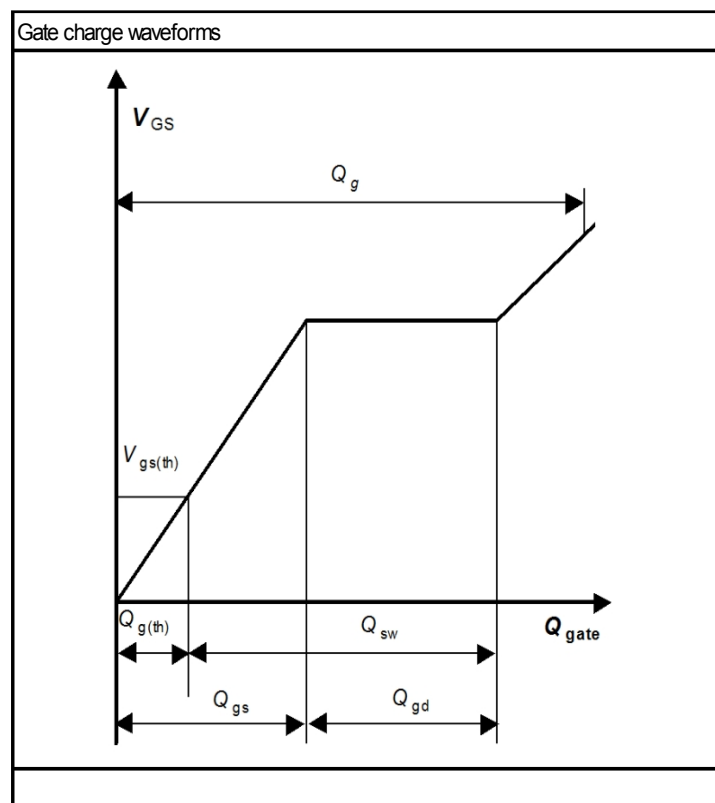
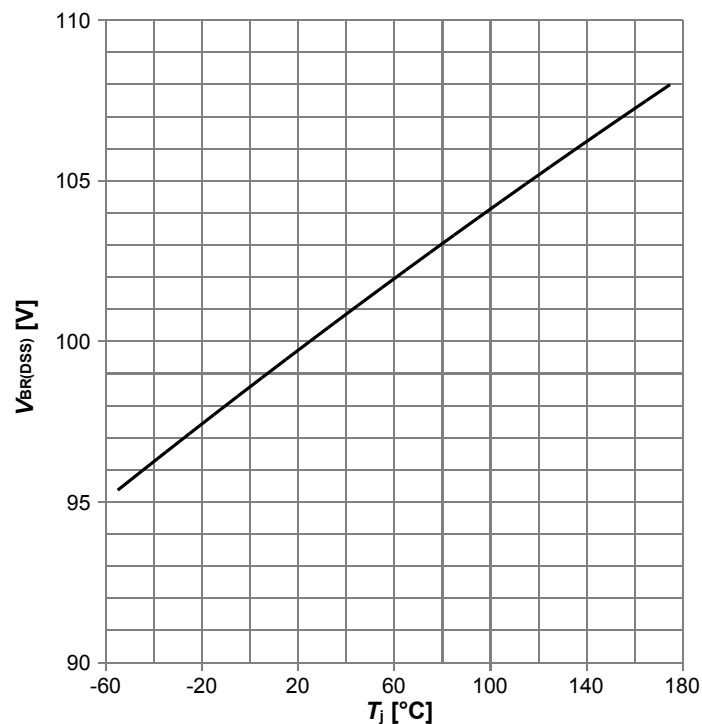
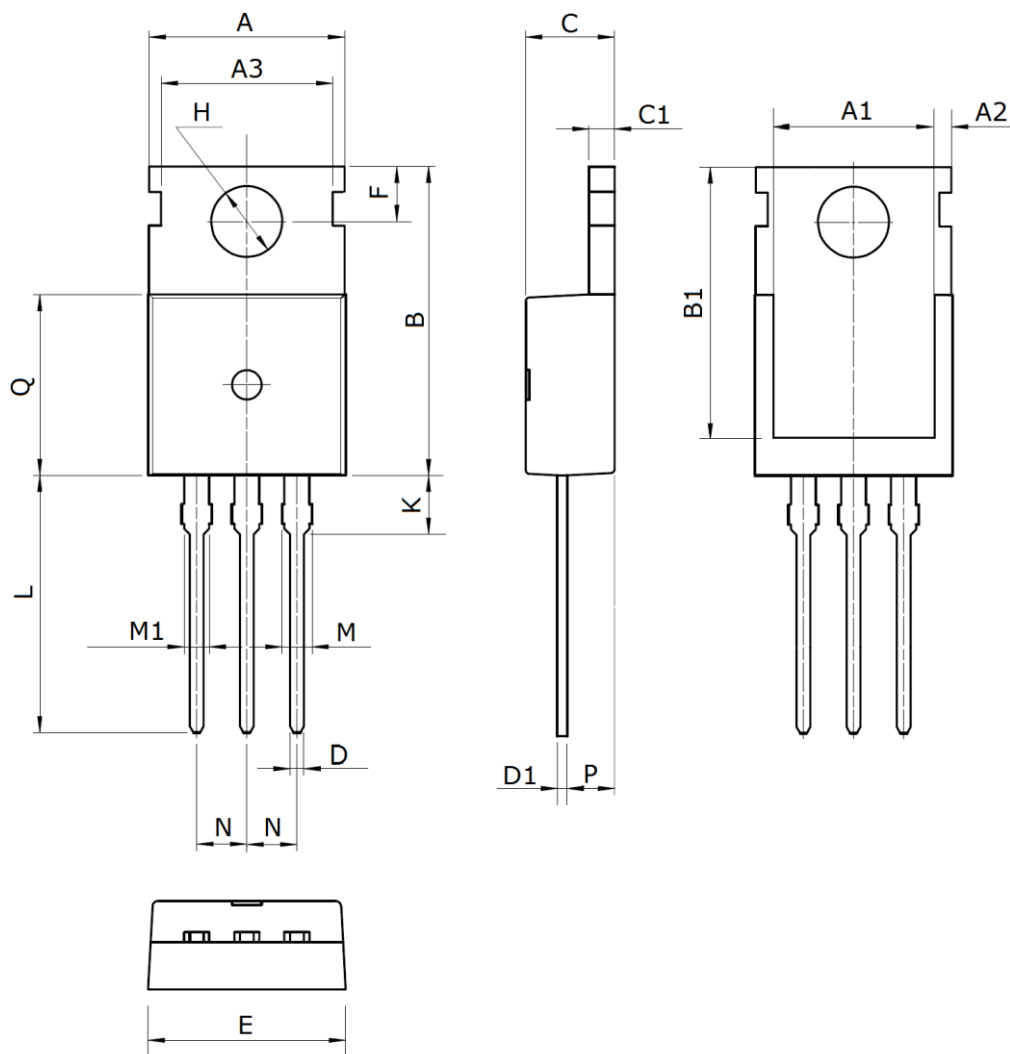


Diagram 15: Drain-source breakdown voltage

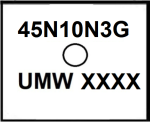


Package Mechanical Data TO-220



Symbol	Dimensions (mm)	Symbol	Dimensions (mm)	Symbol	Dimensions (mm)
A	10.0±0.3	C1	1.3±0.2	L	13.2±0.4
A1	8.0±0.2	D	0.8±0.2	M	1.38±0.1
A2	0.94±0.1	D1	0.5±0.1	M1	1.28±0.1
A3	8.7±0.1	E	10.0±0.3	N	2.54(typ)
B	15.6±0.4	F	2.8 ±0.1	P	2.4±0.3
B1	13.2±0.2	H	3.6±0.1	Q	9.15±0.25
C	4.5±0.2	K	3.1±0.2		

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW IPP045N10N3G	TO-220	1000	Tube and box