IRFB4115

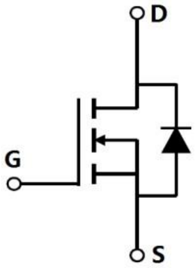
150V N-Channel Enhancement Mode MOSFET

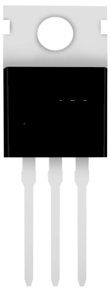
Product Summary

V_{DS}	150	V
$R_{DS(on),max}$	9.3	mΩ
I_D	140	A

Features

- Very low gate charge for high frequency applications
- Optimized for dc-dc conversion
- N-channel, normal level
- Excellent gate charge x $R_{DS(on)}$ product (FOM)
- Very low on-resistance $R_{DS(on)}$
- 150 °C operating temperature
- Pb-free lead plating; RoHS compliant
- Qualified according to JEDEC[1)] for target application
- Halogen-free according to IEC61249-2-21





Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
JCW093KNG	TO-220-3L		1000
JCW093KNK	TO-263-3L		1000

Maximum ratings, at T_j=25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	T_C=25 °C	140	A
		T_C=100 °C	110	
		T_A=25 °C, R_{thJA}=50 K/W[2)]	17.0	
Pulsed drain current[3)]	$I_{D,pulse}$	T_C=25 °C	400	
Avalanche energy, single pulse	E_{AS}	I_D=50 A, R_{GS}=25 Ω	350	mJ
Gate source voltage	V_{GS}		±20	V
Power dissipation	P_{tot}	T_C=25 °C	156	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 - case	R_{thJC}		-	-	0.8	K/W
Thermal resistance, junction - ambient	R_{thJA}	minimal footprint	-	-	62	
		6 cm^2 cooling area[2]	-	-	50	
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	150	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=120 µA	2	2.7	3.5	
Zero gate voltage drain current	I_{DSS}	V_{DS}=100 V, V_{GS}=0 V, T_j=25 °C	-	0.01	1	µA
		V_{DS}=100 V, V_{GS}=0 V, T_j=125 °C	-	10	100	
Gate-source leakage current	I_{GSS}	V_{GS}=20 V, V_{DS}=0 V	-	1	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10 V, I_D=50 A	-	7.3	9.3	mΩ
		V_{GS}=6 V, I_D=25 A	-	8.7	10.6	
Gate resistance	R_G		-	1.9	-	Ω
Transconductance	g_{fs}	$\lvert V_{DS}\rvert>2\lvert I_D\rvert R_{DS(on)max}$, I_D=50 A	48	96	-	S

[1] J-STD20 and JESD22

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

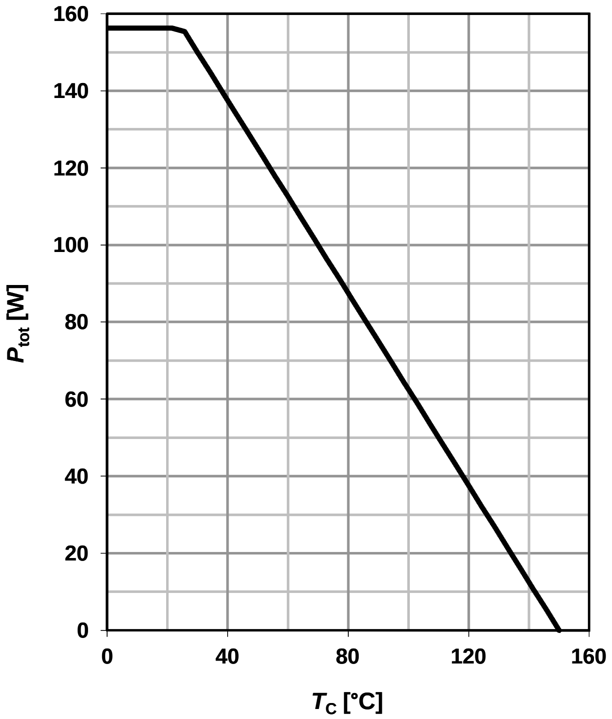
[3] see figure 3

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic characteristics						
Input capacitance	C_{iss}	V_{GS}=0 V, V_{DS}=50 V, f=1 MHz	-	4500	-	pF
Output capacitance	C_{oss}		-	790	-	
Reverse transfer capacitance	C_{rss}		-	30	-	
Turn-on delay time	$t_{d(on)}$	V_{DD}=50 V, V_{GS}=10 V, I_D=25 A, R_G=1.6 Ω	-	16	-	ns
Rise time	t_r		-	14	-	
Turn-off delay time	$t_{d(off)}$		-	41	-	
Fall time	t_f		-	11	-	
Gate Charge Characteristics[4]						
Gate to source charge	Q_{gs}	V_{DD}=50 V, I_D=50 A, V_{GS}=0 to 10 V	-	20	-	nC
Gate to drain charge	Q_{gd}		-	11	-	
Switching charge	Q_{sw}		-	19	-	
Gate charge total	Q_g		-	63	-	
Gate plateau voltage	$V_{plateau}$		-	4.4	-	V
Output charge	Q_{oss}	V_{DD}=50 V, V_{GS}=0 V	-	84	-	nC
Reverse Diode						
Diode continous forward current	I_S	T_C=25 °C	-	-	87	A
Diode pulse current	$I_{S,pulse}$		-	-	400	
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=50 A, T_j=25 °C	-	1	1.2	V
Reverse recovery time	t_{rr}	V_R=50 V, I_F=25 A, di_F/dt=100 A/µs	-	56	-	ns
Reverse recovery charge	Q_{rr}		-	101	-	nC

[4] See figure 16 for gate charge parameter definition

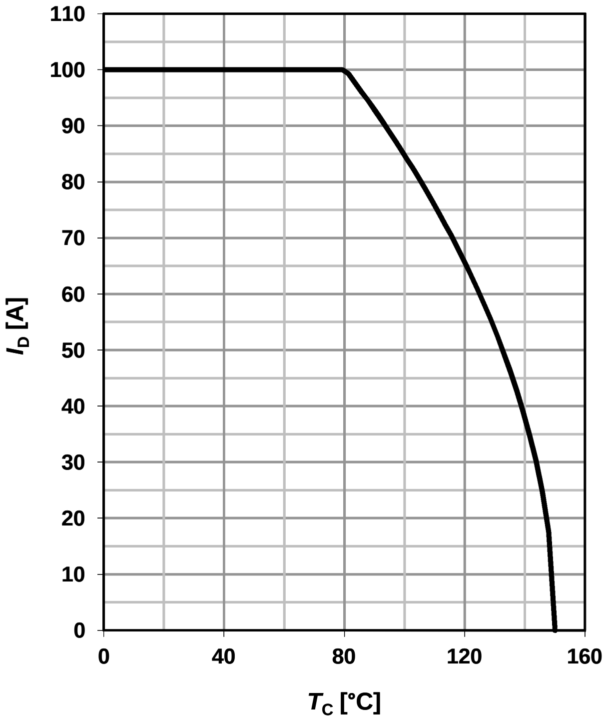
1 Power dissipation

P_{tot}=f(T_C)



2 Drain current

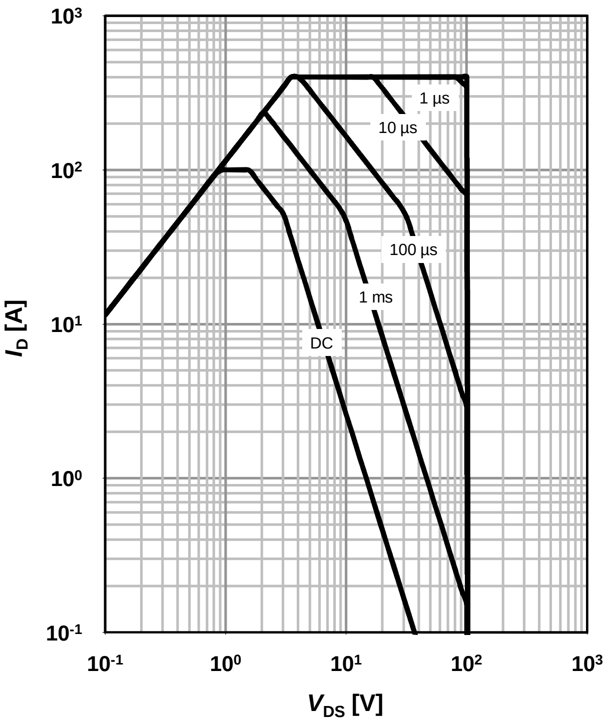
I_D=f(T_C); V_{GS}≥10 V



3 Safe operating area

I_D=f(V_{DS}); T_C=25 °C; D=0

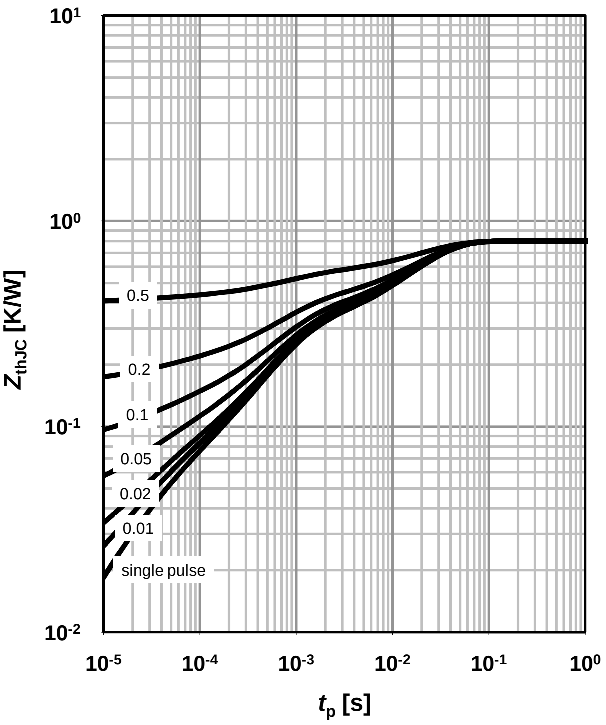
parameter: t_p



4 Max. transient thermal impedance

Z_{thJC}=f(t_p)

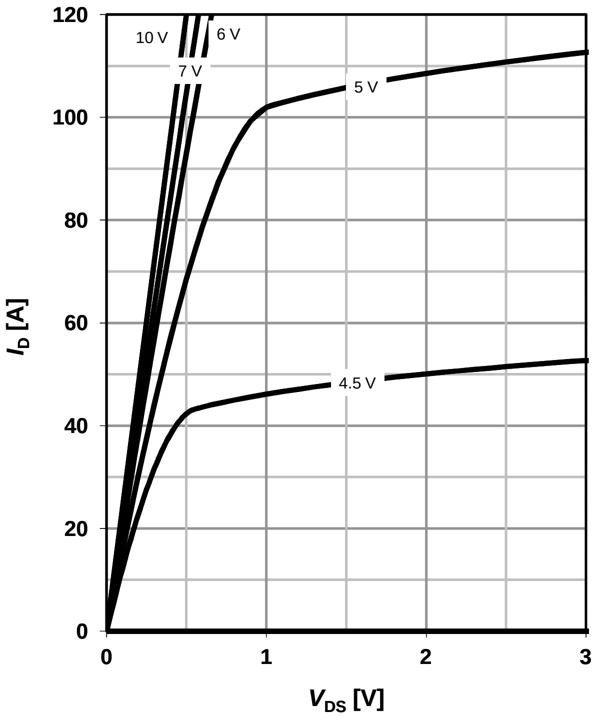
parameter: D=t_p/T



5 Typ. output characteristics

$I_D=f(V_{DS})$; $T_j=25$ °C

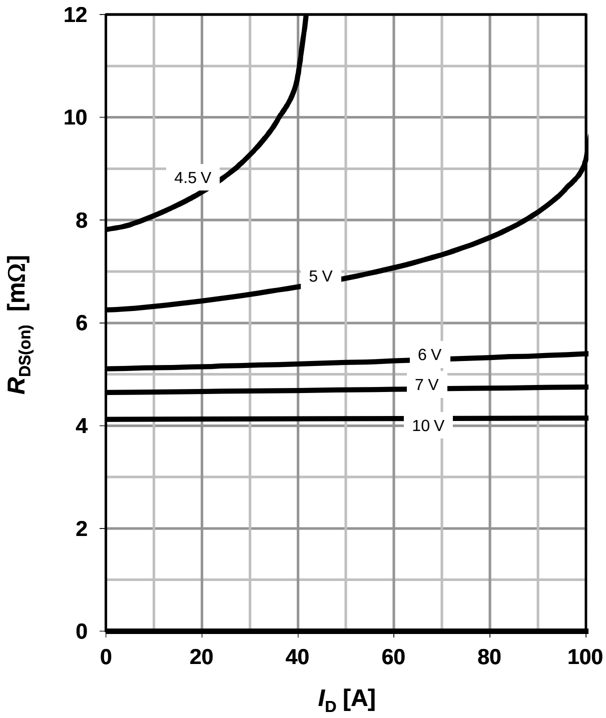
parameter: V_{GS}



6 Typ. drain-source on resistance

$R_{DS(on)}=f(I_D)$; $T_j=25$ °C

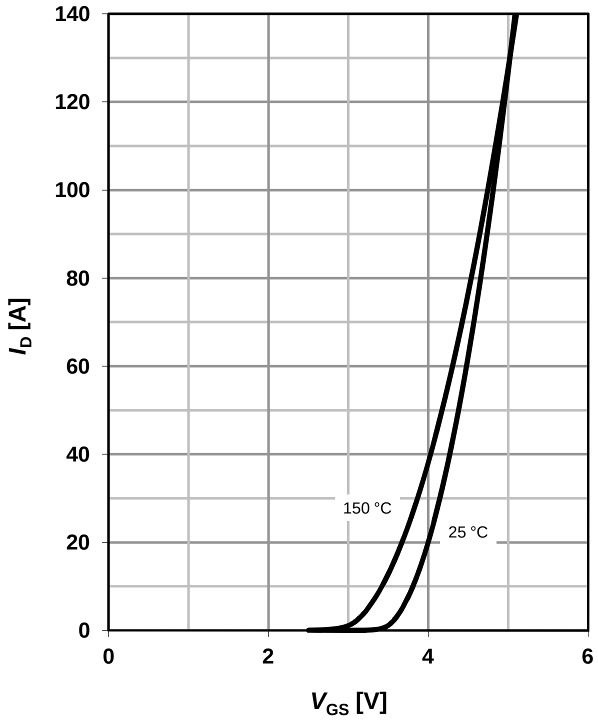
parameter: V_{GS}



7 Typ. transfer characteristics

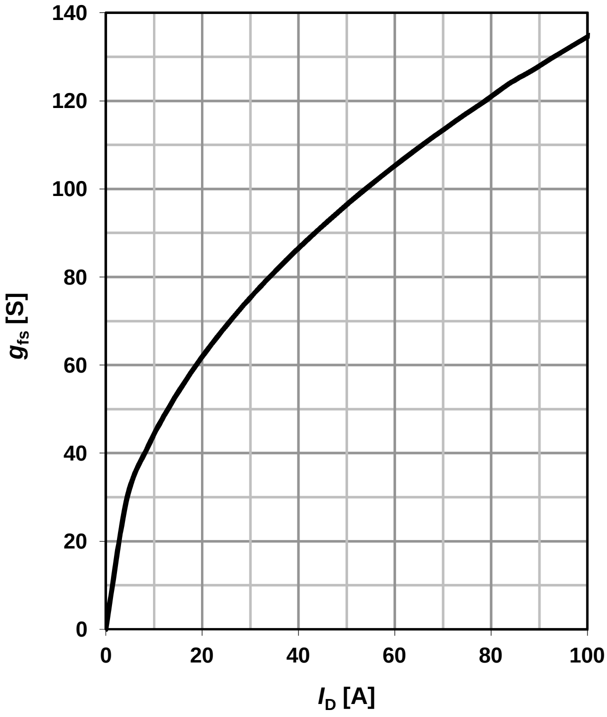
$I_D=f(V_{GS})$; $|V_{DS}|>2|I_D|R_{DS(on)max}$

parameter: T_j



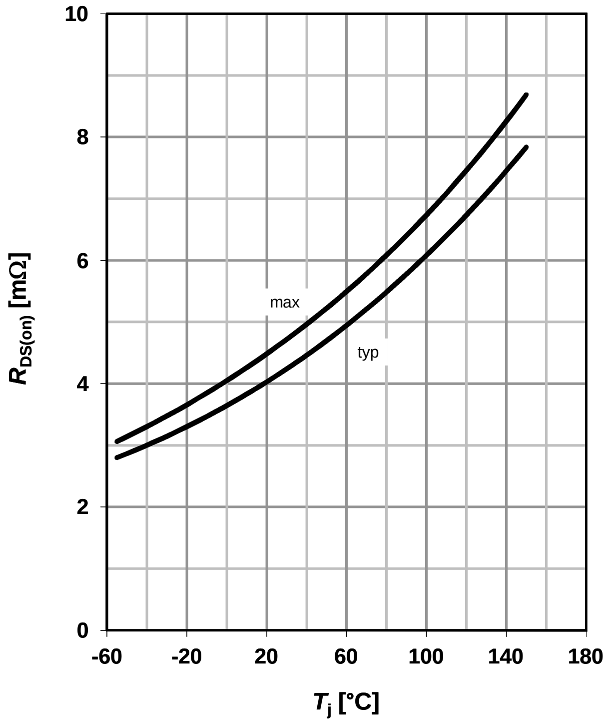
8 Typ. forward transconductance

$g_{fs}=f(I_D)$; $T_j=25$ °C



9 Drain-source on-state resistance

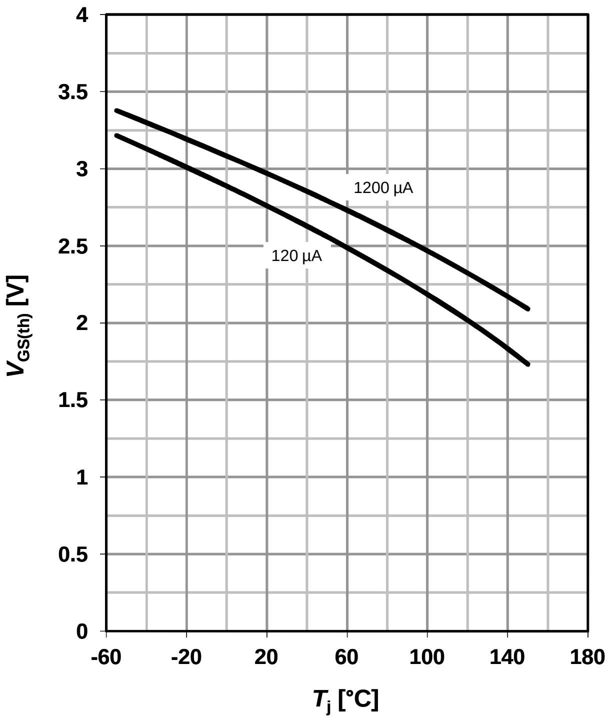
$R_{DS(on)}$=f(T_j); I_D=50 A; V_{GS}=10 V



10 Typ. gate threshold voltage

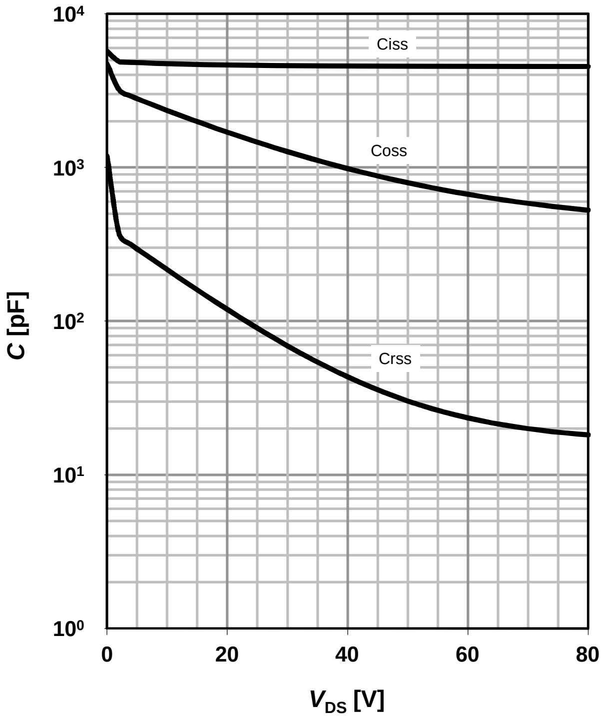
$V_{GS(th)}$=f(T_j); V_{GS}=V_{DS}

parameter: I_D



11 Typ. capacitances

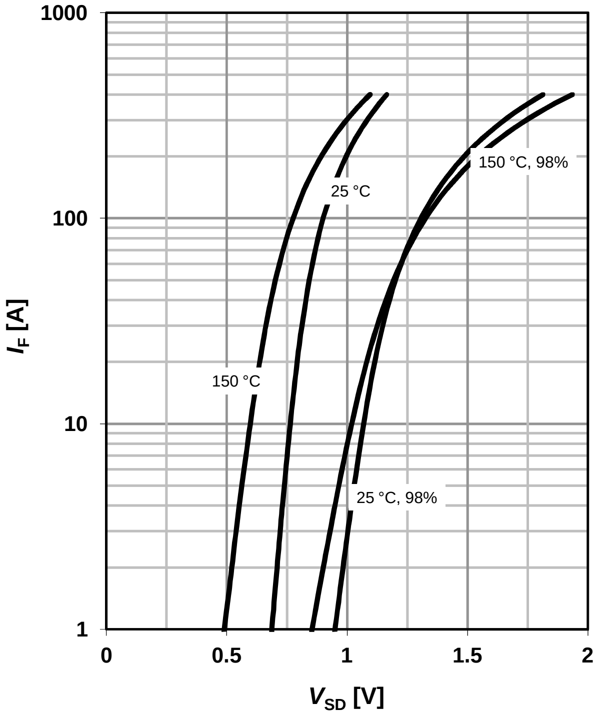
C=f(V_{DS}); V_{GS}=0 V; f=1 MHz



12 Forward characteristics of reverse diode

I_F=f(V_{SD})

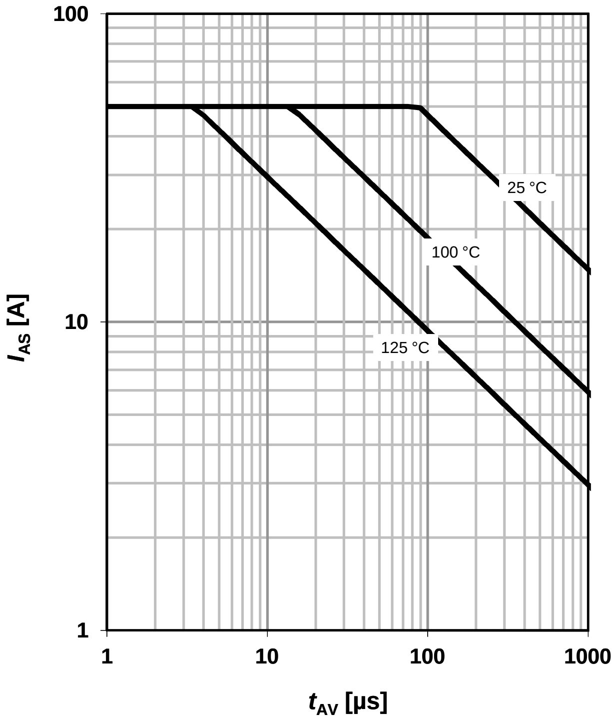
parameter: T_j



13 Avalanche characteristics

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

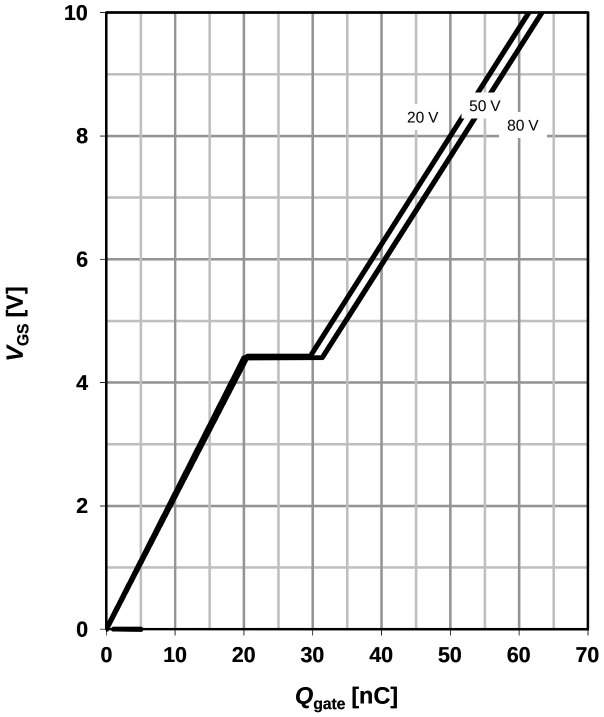
parameter: $T_{j(start)}$



14 Typ. gate charge

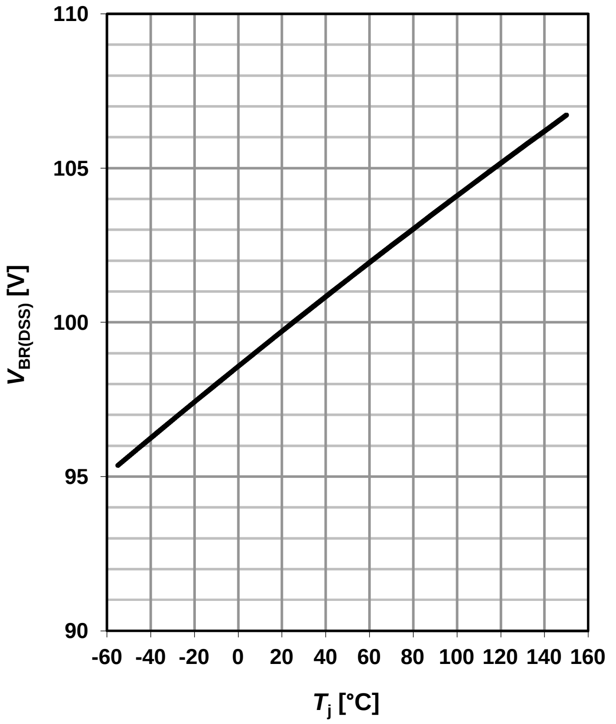
$V_{GS}=f(Q_{gate})$; $I_D=50$ A pulsed

parameter: V_{DD}

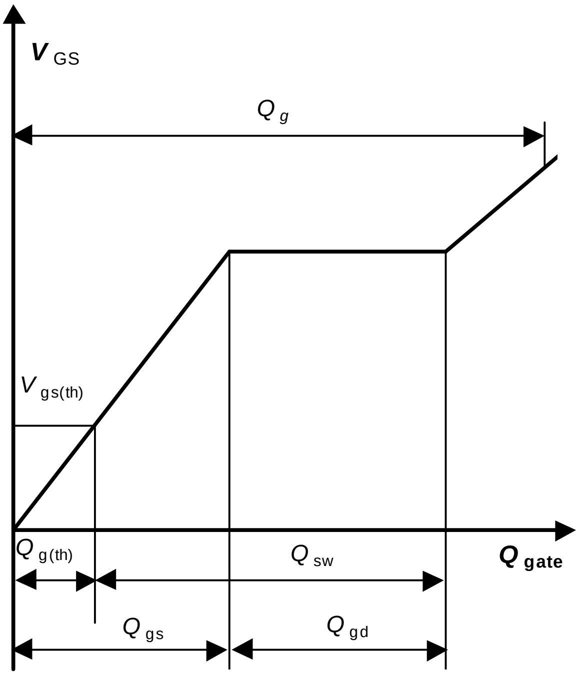


15 Drain-source breakdown voltage

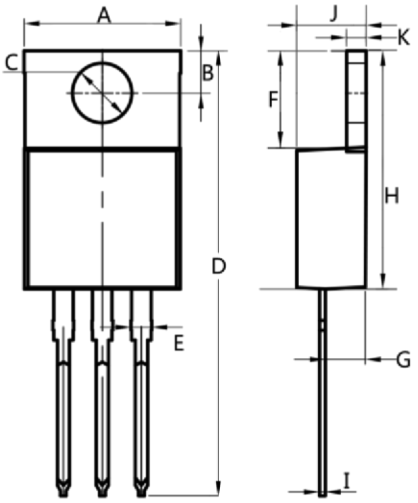
$V_{BR(DSS)}=f(T_j)$; $I_D=1$ mA



16 Gate charge waveforms

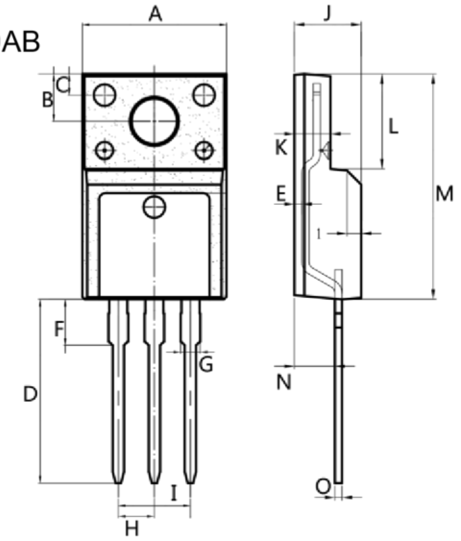


TO-220AB



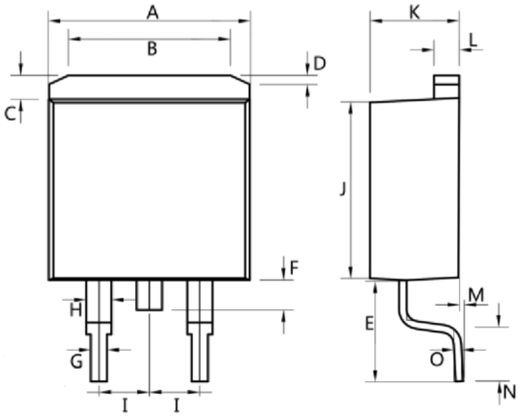
Dim.	Min.	Max.
A	10.0	10.4
B	2.5	3.0
C	3.5	4.0
D	28.0	30.0
E	1.1	1.5
F	6.2	6.6
G	2.9	3.3
H	15.0	16.0
I	0.35	0.45
J	4.3	4.7
K	1.2	1.4
All Dimensions in millimeter		

ITO-220AB



Dim.	Min.	Max.
A	9.9	10.3
B	2.9	3.5
C	1.15	1.45
D	12.75	13.25
E	0.55	0.75
F	3.1	3.5
G	1.25	1.45
H	Typ 2.54	
I	Typ 5.08	
J	4.55	4.75
K	2.4	2. 7
L	6.35	6.75
M	15.0	16.0
N	2.75	3.15
O	0.45	0.60
All Dimensions in millimeter		

TO-263



Dim.	Min.	Max.
A	10.0	10. 5
B	7.25	7.75
C	1.3	1.5
D	0.55	0.75
E	5.0	6.0
F	1.4	1.6
G	0.75	0.95
H	1.15	1.35
I	Typ 2.54	
J	8.4	8.6
K	4.4	4.6
L	1.25	1.45
M	0.02	0.1
N	2.4	2.8
O	0.35	0.45
All Dimensions in millimeter		