IXYS

IXFN70N120SK

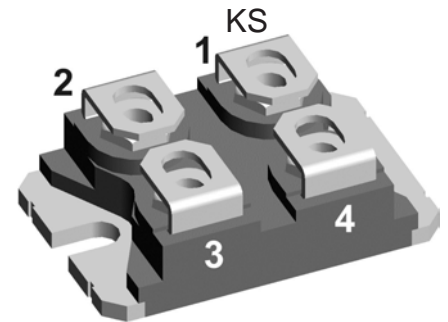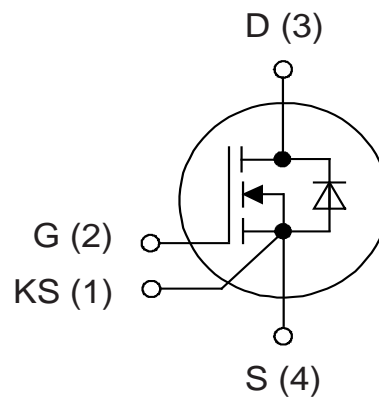# SiC Power MOSFET

I_{D25} = 68 A
V_{DSS} = 1200 V
$R_{DS(on) max}$ = 34 mΩ

Kelvin Source gate connection

Part number
IXFN70N120SK

KS

Backside: isolated
UL pending

D (3)

G (2)

KS (1)

S (4)

Features / Advantages:
- High speed switching with low capacitances
- High blocking voltage with low $R_{DS(on)}$
- Easy to parallel and simple to drive
- Resistant to latch-up
- Real Kelvin source connection

Applications:
- Solar inverters
- High voltage DC/DC converters
- Motor drives
- Switch mode power supplies
- UPS
- Battery chargers
- Induction heating

Package: SOT-227B (minibloc)
- Isolation Voltage: 3000 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Base plate with Aluminium nitride isolation
- Advanced power cycling

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![IXYS logo]

MOSFET

Symbol	Definitions	Conditions		min.	typ.	max.	
V_{DSS}	drain source breakdown voltage	V_{GS} = 0 V, I_D = 100 µA		1200			V
V_{GSM}	max transient gate source voltage			-10		+25	V
V_{GS}	continous gate source voltage	recommended operational value		-5		+20	V
I_{D25}	drain current		T_C = 25°C			68	A
I_{D80}		V_{GS} = 20 V	T_C = 80°C			55	A
I_{D100}			T_C = 100°C			48	A
R_{DSon}	static drain source on resistance	I_D = 50 A; V_{GS} = 20 V	T_{VJ} = 25°C		25	34	mΩ
			T_{VJ} = 175°C		52		mΩ
$V_{GS(th)}$	gate threshold voltage	I_D = 15 mA; V_{GS} = V_{DS}	T_{VJ} = 25°C	2.0	2.6	4.0	V
			T_{VJ} = 175°C		2.1		V
I_{DSS}	drain source leakage current	V_{DS} = 1200 V; V_{GS} = 0 V	T_{VJ} = 25°C		2	100	µA
I_{GSS}	gate source leakage current	V_{DS} = 0 V; V_{GS} = 20 V	T_{VJ} = 25°C			0.6	µA
R_G	internal gate resistance	f = 1 MHz, V_{AC} = 25 mV, ESR of C_{ISS}			1.1		Ω
C_{iss}	input capacitance				2790		pF
C_{oss}	output capacitance	V_{DS} = 1000 V; V_{GS} = 0 V; f = 1 MHz	T_{VJ} = 25°C		220		pF
C_{rss}	reverse transfer (Miller) capacitance				15		pF
Q_g	total gate charge				161		nC
Q_{gs}	gate source charge	V_{DS} = 800 V; I_D = 50 A; V_{GS} = -5/20 V	T_{VJ} = 25°C		46		nC
Q_{gd}	gate drain (Miller) charge				50		nC
$t_{d(on)}$	turn-on delay time				30		ns
t_r	current rise time				15		ns
$t_{d(off)}$	turn-off delay time	Inductive switching			82		ns
t_f	current fall time	V_{DS} = 800 V; I_D = 50 A	T_{VJ} = 25°C		27		ns
E_{on}	turn-on energy per pulse	V_{GS} = -5 / 20 V; R_G = 15 Ω (external)			1.35		mJ
E_{off}	turn-off energy per pulse	Freewheeling diode is Mosfet's body diode			0.76		mJ
$E_{rec(off)}$	reverse recovery losses at turn-off				0.13		mJ
$t_{d(on)}$	turn-on delay time				28		ns
t_r	current rise time				12		ns
$t_{d(off)}$	turn-off delay time	Inductive switching			125		ns
t_f	current fall time	V_{DS} = 800 V; I_D = 50 A	T_{VJ} = 150°C		28		ns
E_{on}	turn-on energy per pulse	V_{GS} = -5 / 20 V; R_G = 15 Ω (external)			1.71		mJ
E_{off}	turn-off energy per pulse	Freewheeling diode is Mosfet's body diode			0.78		mJ
$E_{rec(off)}$	reverse recovery losses at turn-off				0.29		mJ
R_{thJC}	thermal resistance junction to case					0.45	K/W
R_{thJH}	thermal resistance junction to heatsink	with heatsink compound; IXYS test setup			0.6		K/W

Source-Drain Diode

Symbol	Definitions	Conditions		min.	typ.	max.	
V_{SD}	forward voltage drop	I_F = 50 A; V_{GS} = -5 V	T_{VJ} = 25°C		4.3		V
			T_{VJ} = 150°C		3.7		V
t_{rr}	reverse recovery time	V_{GS} = -5 V; I_F = 50 A; V_R = 800 V	T_{VJ} = 25°C		35		ns
Q_{RM}	reverse recovery charge (intrinsic diode)	Mosfet gate drive:			0.52		µC
I_{RM}	max. reverse recovery current	V_{GS} = -5 / 20 V; R_G = 15 Ω			33		A
dI_F/dt	current slew rate				3380		A/µs
t_{rr}	reverse recovery time	V_{GS} = -5 V; I_F = 50 A; V_R = 800 V	T_{VJ} = 150°C		30		ns
Q_{RM}	reverse recovery charge (intrinsic diode)	Mosfet gate drive:			1.23		µC
I_{RM}	max. reverse recovery current	V_{GS} = -5 / 20 V; R_G = 15 Ω			59		A
dI_F/dt	current slew rate				4250		A/µs

Note:
When using SiC Body Diode the maximum recommended V_{GS} = -5V

IXYS reserves the right to change limits, test conditions and dimensions.

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Package SOT-227B (minibloc)

Symbol	Definitions	Conditions		min.	typ.	max.	Unit
I_{RMS}	*RMS current*	*per terminal*					A
T_{stg}	*storage temperature*			-40		150	°C
T_{op}	*operation temperature*			-40		150	°C
T_{VJ}	*virtual junction temperature*			-40		175	°C
Weight					30		g
M_{D}	*mounting torque*			1.1		1.5	Nm
M_{T}	*terminal torque*			1.1		1.5	Nm
d_{Spp/App}	*creepage distance on surface | striking distance through air*	*terminal to backside*	10.5 / 3.2				mm
d_{Spb/Apb}		*terminal to terminal*	8.6 / 6.8				mm
V_{ISOL}	*isolation voltage*	$I_{ISOL} \leq 1$ mA; 50/60 Hz,	t = 1 sec.	3000			V
			t = 1 minute	2500			V

Product Marking

Logo → **IXYS** XXXXX ← Part No.

yywwZ ®RU abcd

DateCode ⌐
Assembly Line
Assembly Code
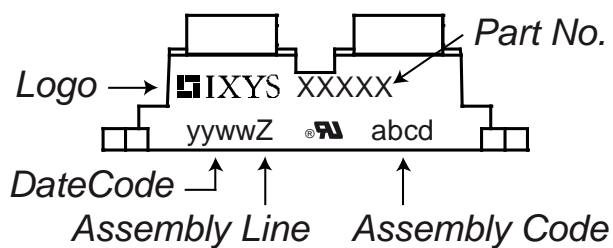
Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	IXFN70N120SK	IXFN70N120SK	Tube	10	517981

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Outlines SOT-227B (minibloc)

*Nut M4 DIN 934
Lens Head
Screw M4x8
DIN 7985*

* Center of each nut pocket
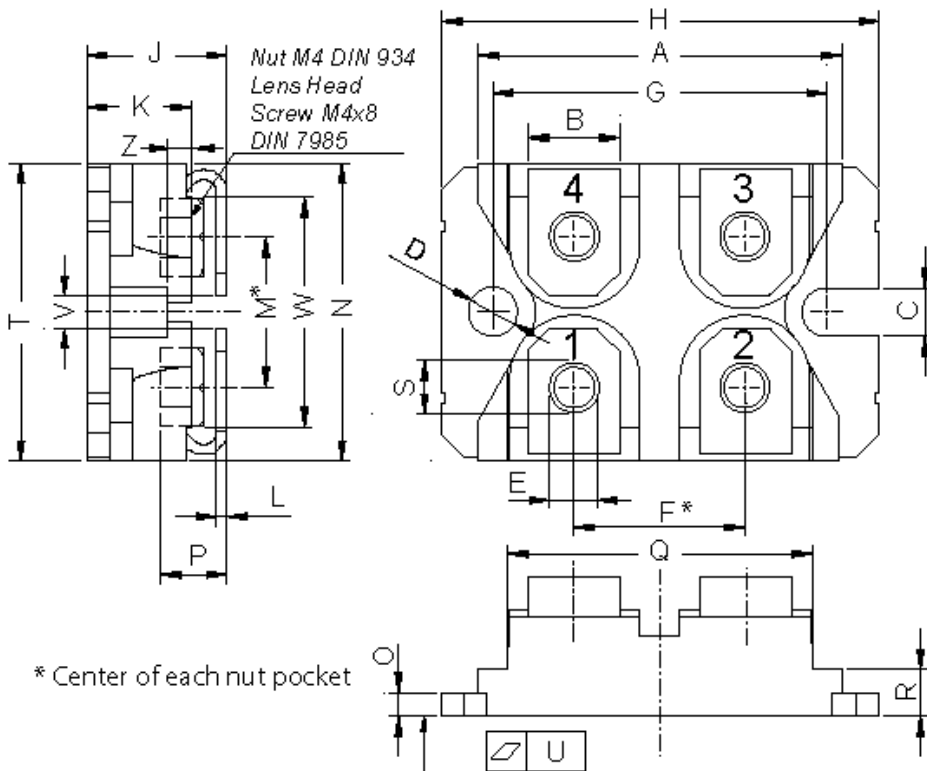
Dim.	Millimeter		Inches	
	min	max	min	max
A	31.50	31.88	1.240	1.255
B	7.80	8.20	0.307	0.323
C	4.09	4.29	0.161	0.169
D	4.09	4.29	0.161	0.169
E	4.09	4.29	0.161	0.169
F	14.91	15.11	0.587	0.595
G	30.12	30.30	1.186	1.193
H	37.80	38.23	1.488	1.505
J	11.68	12.22	0.460	0.481
K	8.92	9.60	0.351	0.378
L	0.74	0.84	0.029	0.033
M	12.50	13.10	0.492	0.516
N	25.15	25.42	0.990	1.001
O	1.95	2.13	0.077	0.084
P	4.95	6.20	0.195	0.244
Q	26.54	26.90	1.045	1.059
R	3.94	4.42	0.155	0.167
S	4.55	4.85	0.179	0.191
T	24.59	25.25	0.968	0.994
U	-0.05	0.10	-0.002	0.004
V	3.20	5.50	0.126	0.217
W	19.81	21.08	0.780	0.830
Z	2.50	2.70	0.098	0.106

D (3)

G (2)

KS (1)

S (4)

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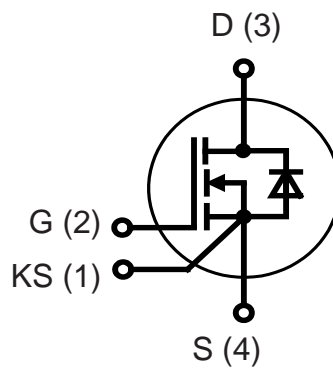
Curves
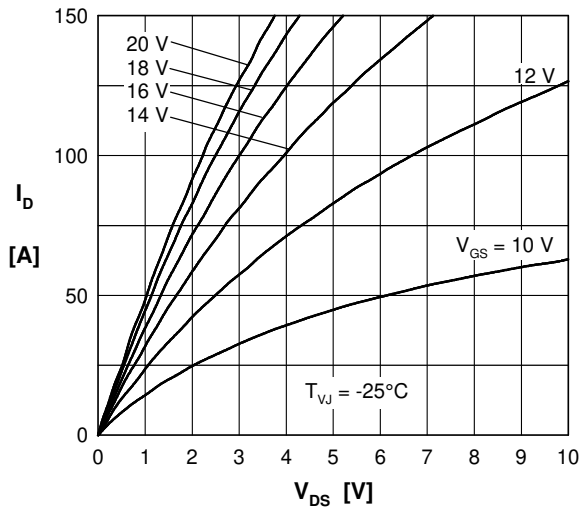
Fig. 1 Typical output characteristics (-25°C)
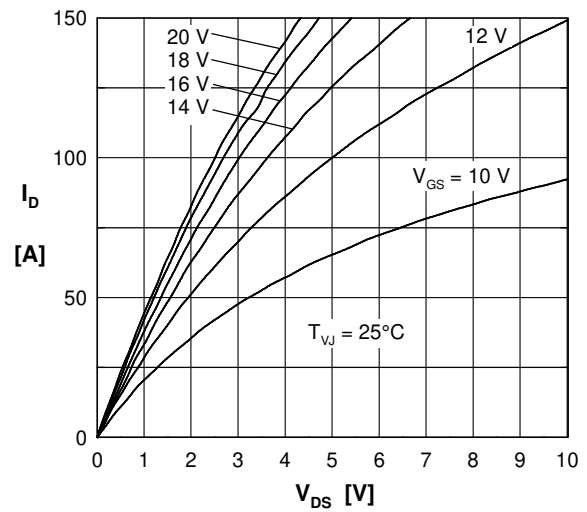
Fig. 2 Typical output characteristics (25°C)
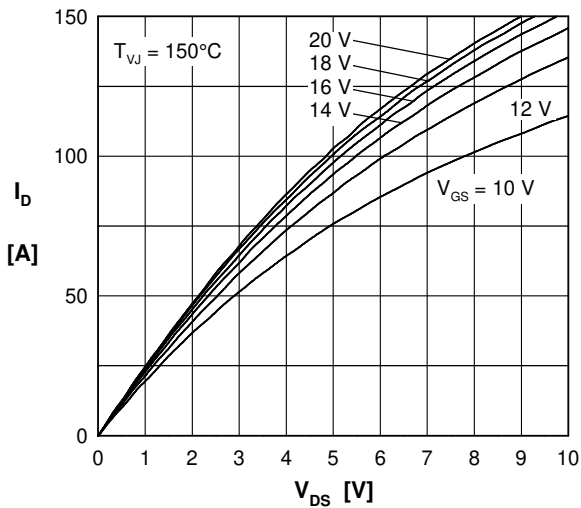
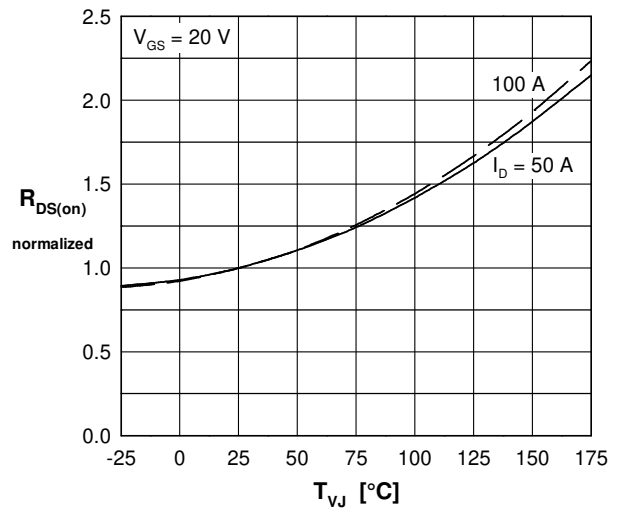Fig. 3 Typical output characteristics (150°C)

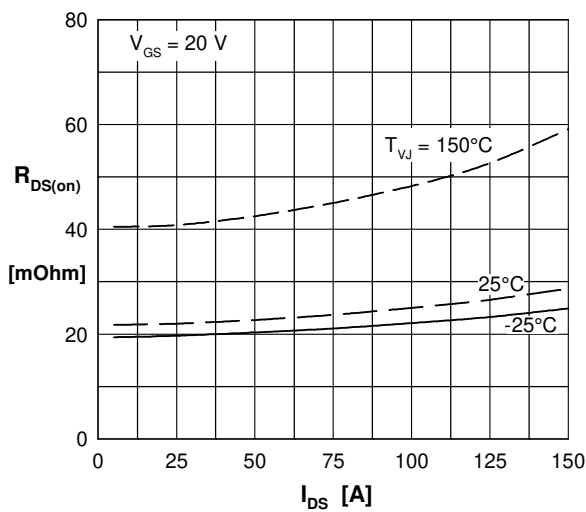Fig. 4 $R_{DS(on)}$ normalized vs. junction temperature T_{VJ}
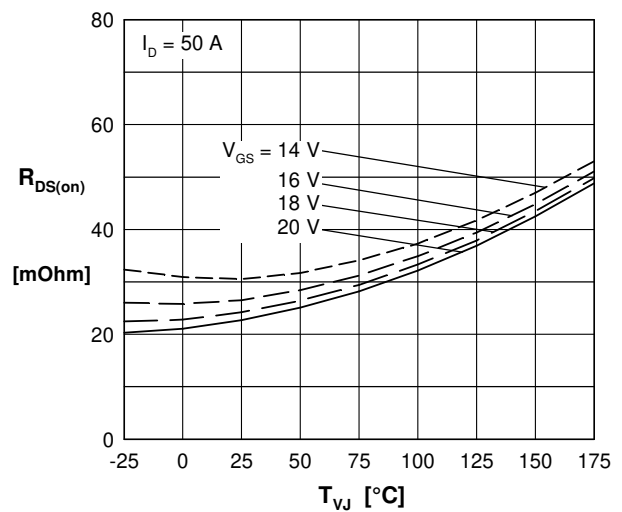

Fig. 5 $R_{DS(on)}$ versus drain current
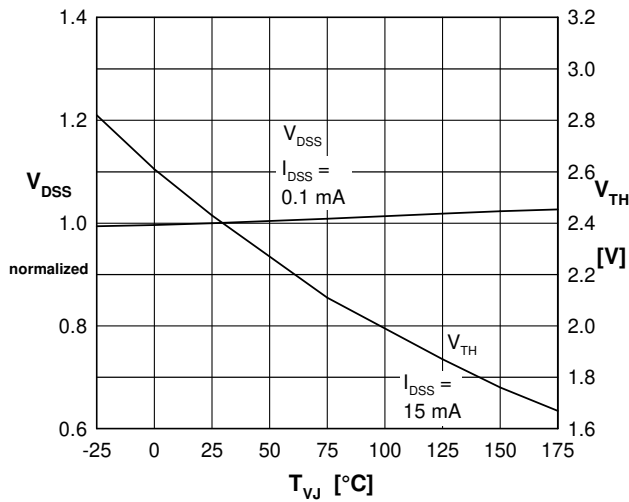

Fig. 6 $R_{DS(on)}$ versus junction temperature T_{VJ}

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Curves

Fig. 7 Norm. breakdow V_{DSS} & treshhold voltage V_{TH} versus junction temperature T_{VJ}
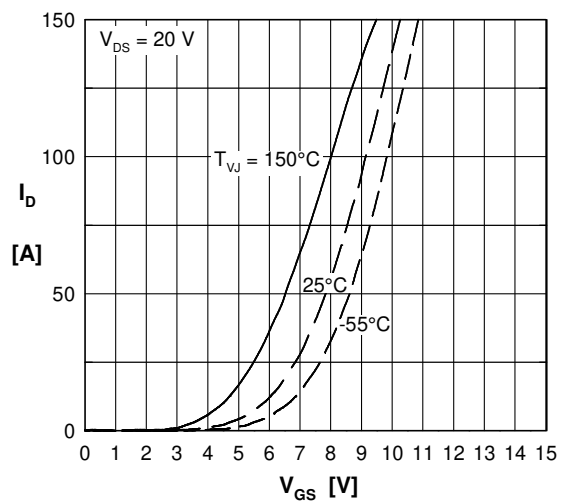
Fig. 8 Typical transfer characteristics
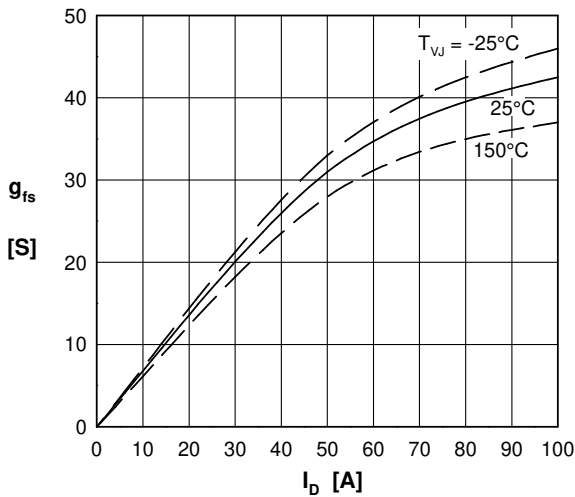
Fig. 9 Typical forward transconductance
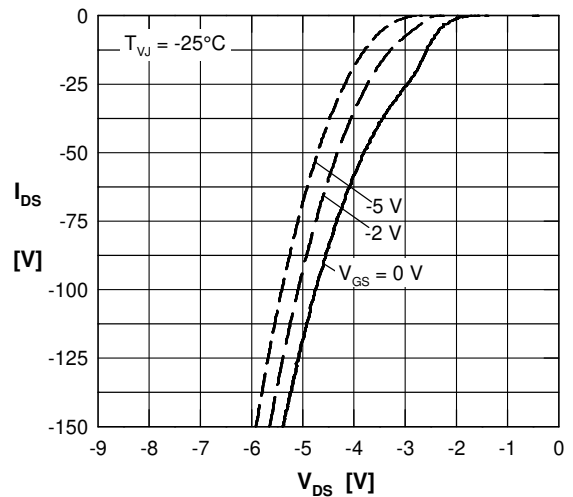
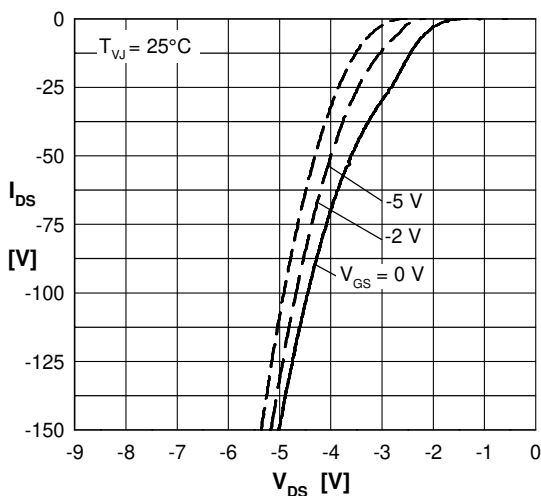Fig. 10 Forward voltage drop of intrinsic diode versus V_{DS} measured at -55°C

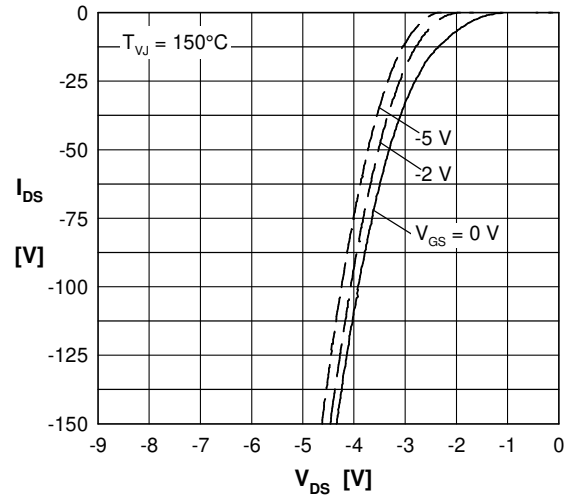Fig. 11 Forward voltage drop of intrinsic diode versus V_{DS} measured at 25°C

Fig. 12 Forward voltage drop of intrinsic diode versus V_{DS} measured at 150°C

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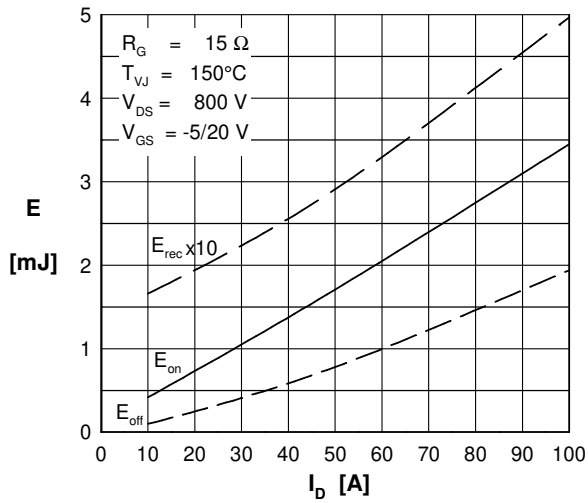
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Curves

Fig. 13 Typical switching energy
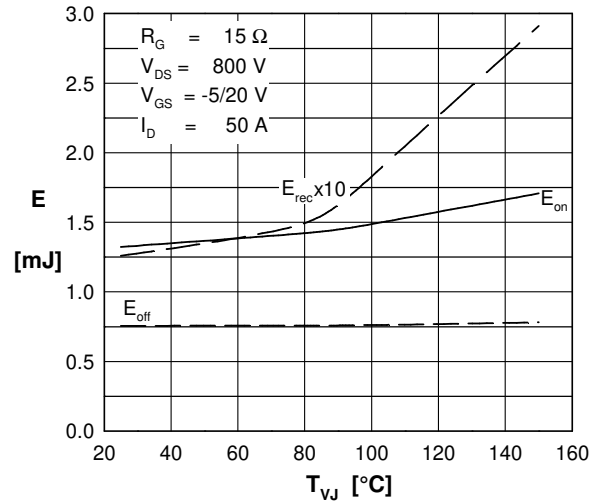versus drain current

Fig. 14 Typical switching energy
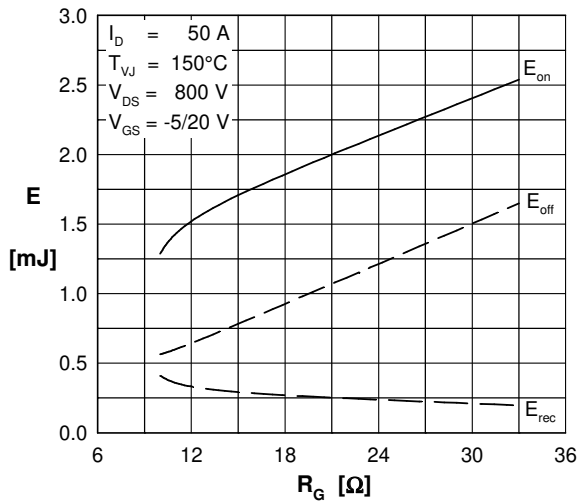versus temperature

Fig. 15 Typical switching energy versus
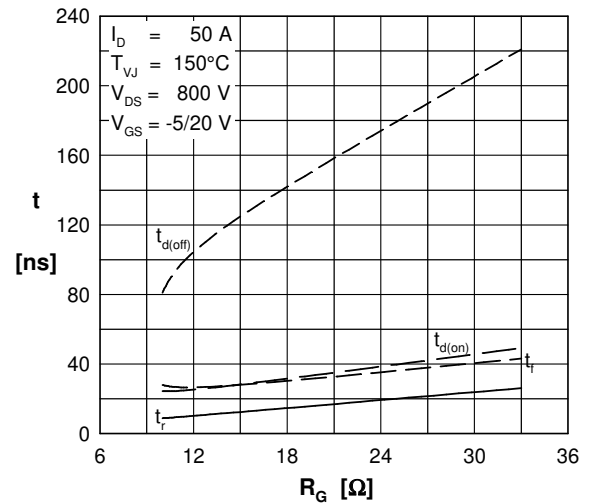external gate resistor

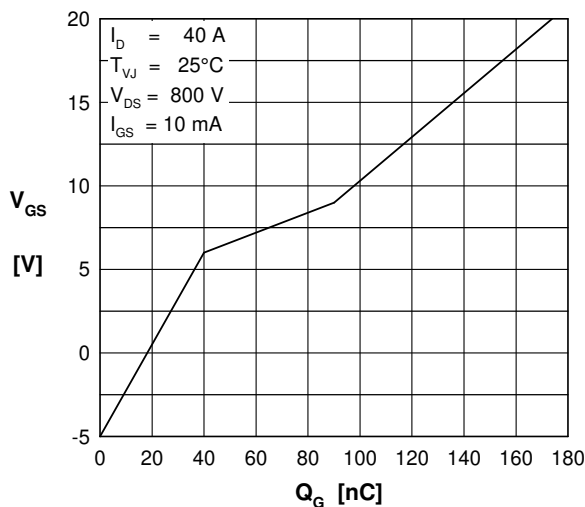Fig. 16 Typical switching time versus
external gate resistor

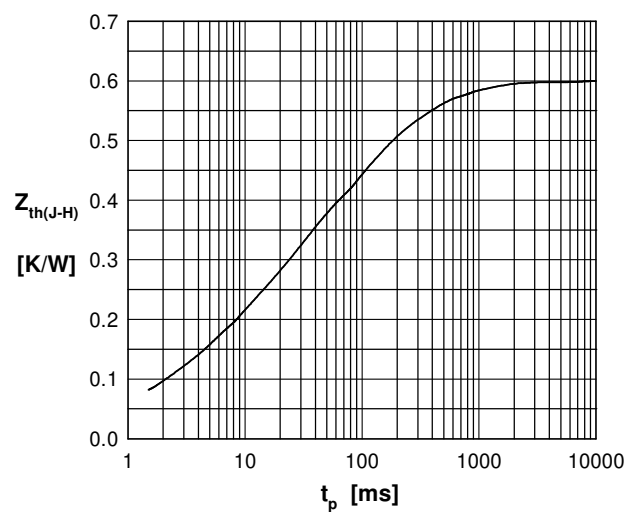Fig. 17 Typical turn on gate charge, trendline

Fig. 18 Typical transient thermal impedance

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