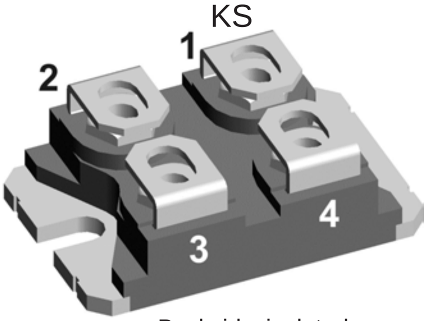
preliminary

SiC Power MOSFET

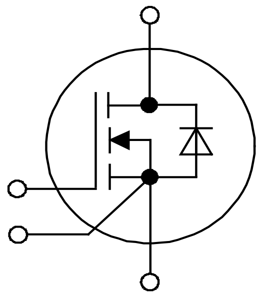
I_{D25} = 68 A
V_{DSS} = 1200 V
$R_{DS(on)\ max}$ = 34 mΩ

Kelvin Source gate connection

Part number
IXFN70N120SK



Backside: isolated
UL pending



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

preliminary

MOSFET				Ratings		
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*	V_{GS} = 20 V; T_C = 25°C			68	A
I_{D80}		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*	V_{DS} = 1000 V; V_{GS} = 0 V; f = 1 MHz; T_{VJ} = 25°C		2790		pF
C_{oss}	*output capacitance*			220		pF
C_{rss}	*reverse transfer (Miller) capacitance*			15		pF
Q_g	*total gate charge*	V_{DS} = 800 V; I_D = 50 A; V_{GS} = -5/20 V; T_{VJ} = 25°C		161		nC
Q_{gs}	*gate source charge*			46		nC
Q_{gd}	*gate drain (Miller) charge*			50		nC
$t_{d(on)}$	*turn-on delay time*	Inductive switching		30		ns
t_r	*current rise time*	V_{DS} = 800 V; I_D = 50 A; T_{VJ} = 25°C		15		ns
$t_{d(off)}$	*turn-off delay time*	V_{GS} = -5 / 20 V; R_G = 15 Ω (external)		82		ns
t_f	*current fall time*	Freewheeling diode is Mosfet's body diode		27		ns
E_{on}	*turn-on energy per pulse*			1.35		mJ
E_{off}	*turn-off energy per pulse*			0.76		mJ
$E_{rec(off)}$	*reverse recovery losses at turn-off*			0.13		mJ
$t_{d(on)}$	*turn-on delay time*	Inductive switching		28		ns
t_r	*current rise time*	V_{DS} = 800 V; I_D = 50 A; T_{VJ} = 150°C		12		ns
$t_{d(off)}$	*turn-off delay time*	V_{GS} = -5 / 20 V; R_G = 15 Ω (external)		125		ns
t_f	*current fall time*	Freewheeling diode is Mosfet's body diode		28		ns
E_{on}	*turn-on energy per pulse*			1.71		mJ
E_{off}	*turn-off energy per pulse*			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				Ratings		
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

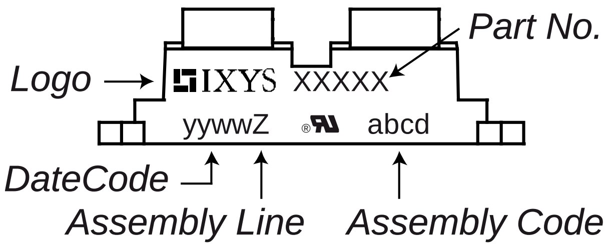
Note:
When using SiC Body Diode the maximum recommended V_{GS} = -5V

IXYS reserves the right to change limits, test conditions and dimensions. 20180405a

Package SOT-227B (minibloc)

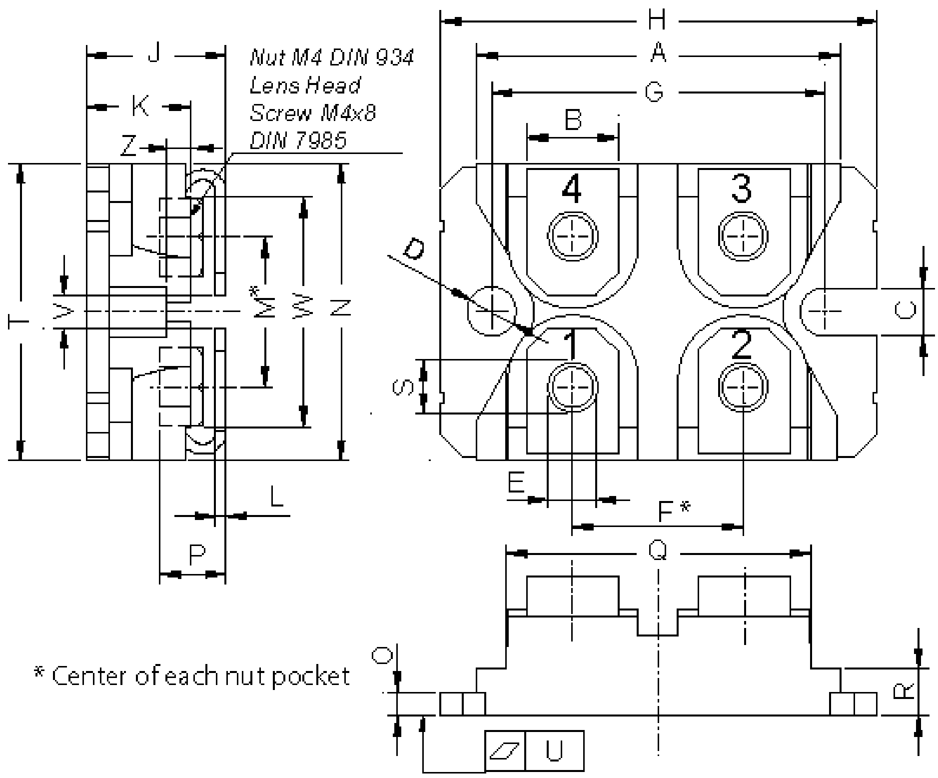
Symbol	Definitions	Conditions		min.	typ.	max.	Unit
					Ratings		
I_{RMS}	*RMS current*	per terminal					A
T_{stg}	*storage temperature*			-40		150	°C
T_{op}	*operation temperature*			-40		150	°C
T_{VJ}	*virtual junction temperature*			-40		175	°C
Weight					30		g
M_D	*mounting torque*			1.1		1.5	Nm
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

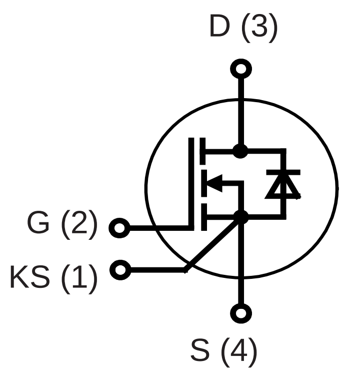


Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	IXFN70N120SK	IXFN70N120SK	Tube	10	517981

Outlines SOT-227B (minibloc)



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



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Curves

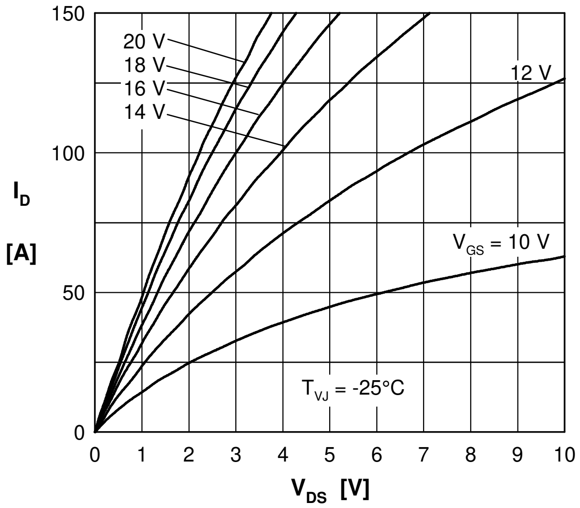

Fig. 1 Typical output characteristics (-25°C)

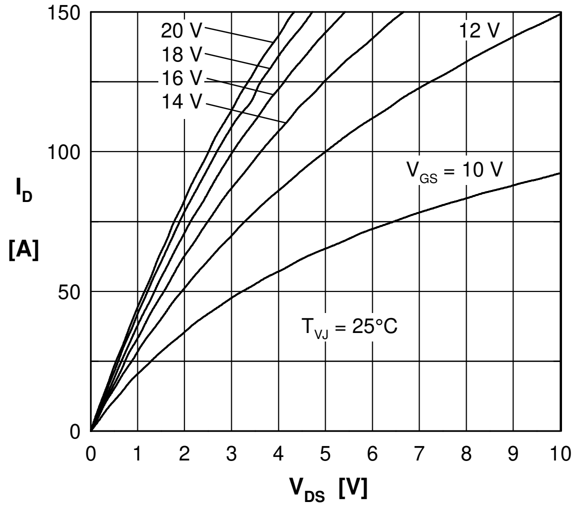

Fig. 2 Typical output characteristics (25°C)

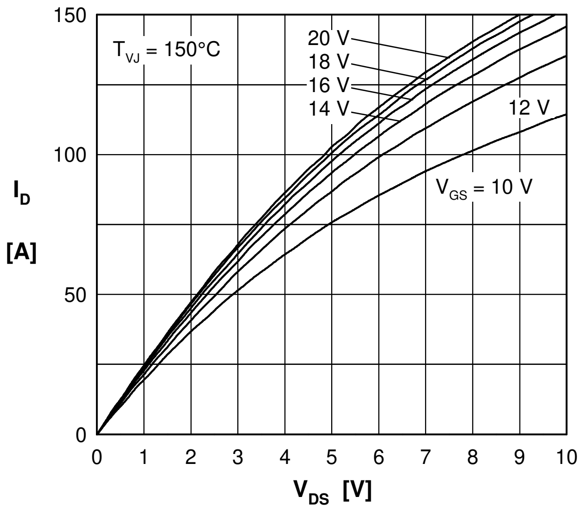

Fig. 3 Typical output characteristics (150°C)

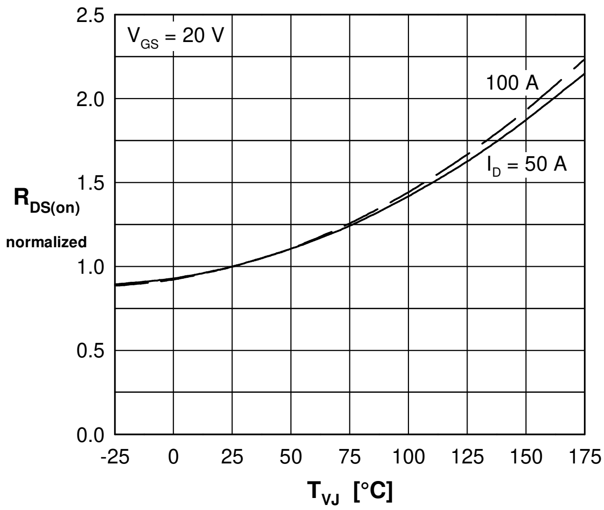

Fig. 4 $R_{DS(on)}$ normalized vs. junction temperature T_{VJ}

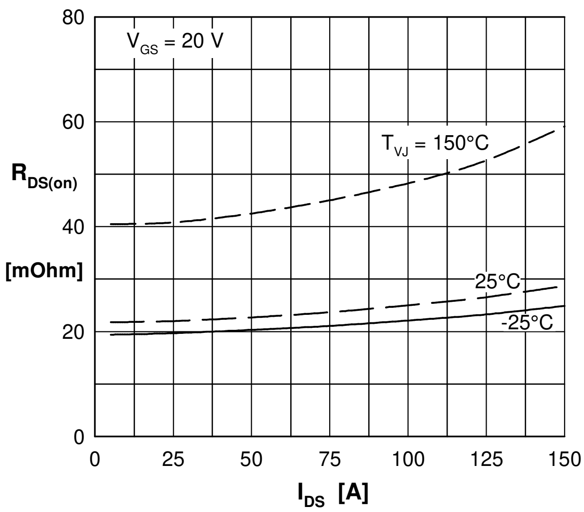

Fig. 5 $R_{DS(on)}$ versus drain current

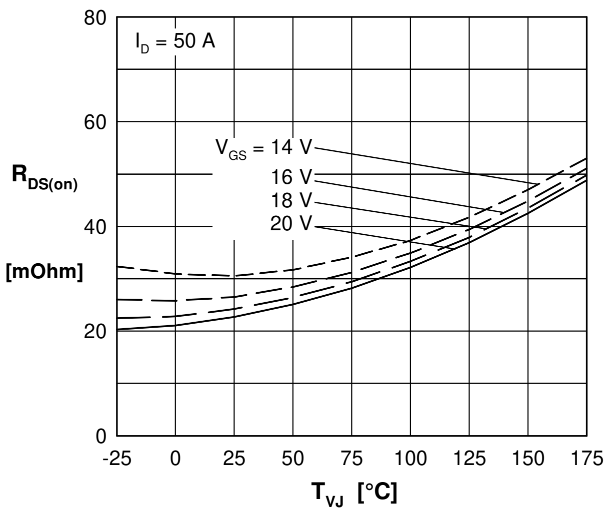

Fig. 6 $R_{DS(on)}$ versus junction temperature T_{VJ}

Curves

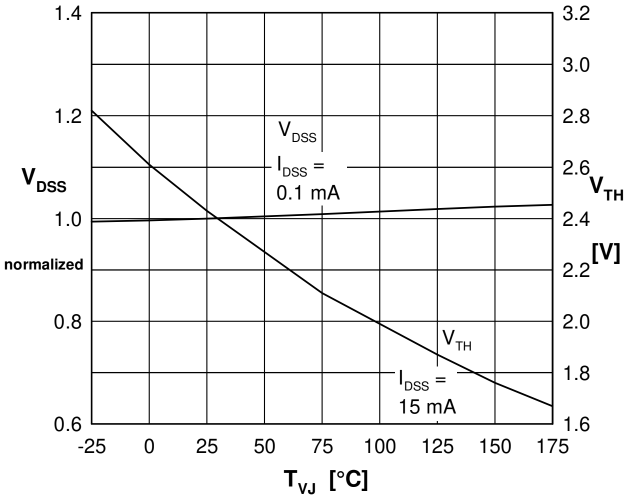

Fig. 7 Norm. breakdow V_{DSS} & treshhold voltage V_{TH} versus junction temperature T_{VJ}

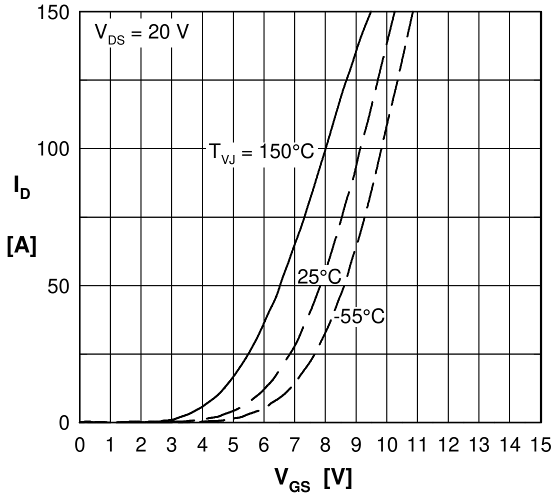

Fig. 8 Typical transfer characteristics

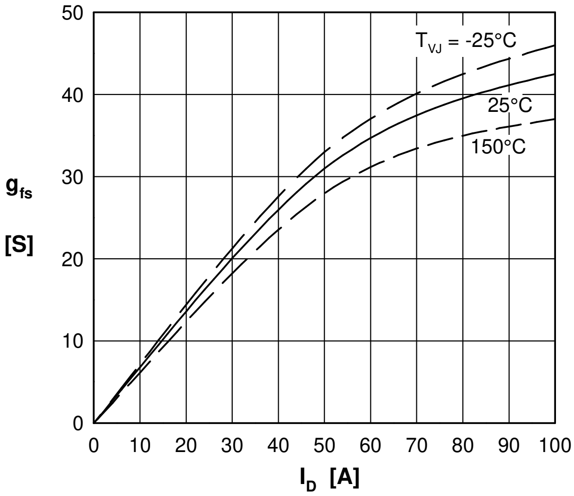

Fig. 9 Typical forward transconductance

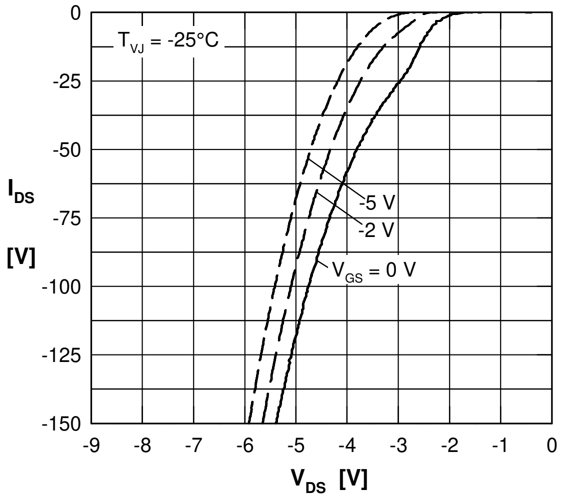

Fig. 10 Forward voltage drop of intrinsic diode versus V_{DS} measured at -55°C

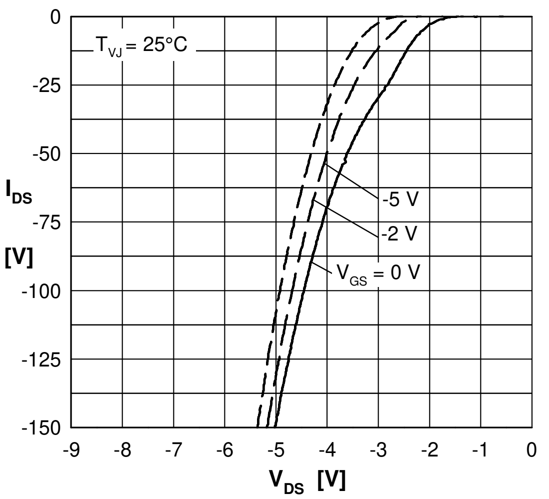

Fig. 11 Forward voltage drop of intrinsic diode versus V_{DS} measured at 25°C

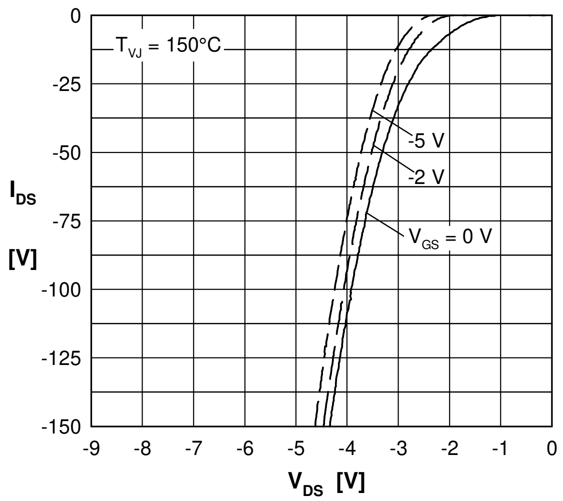

Fig. 12 Forward voltage drop of intrinsic diode versus V_{DS} measured at 150°C

Curves

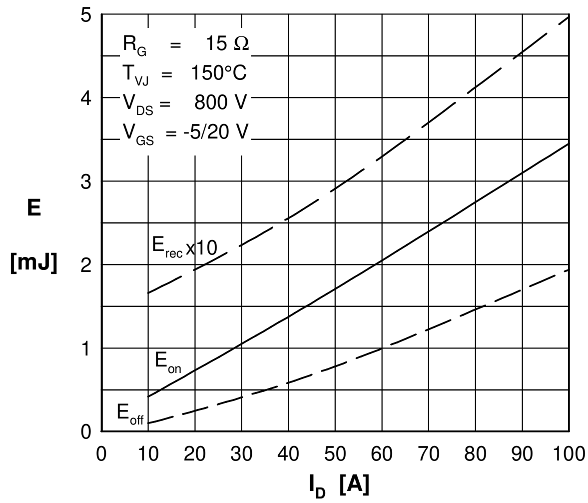

Fig. 13 Typical switching energy versus drain current

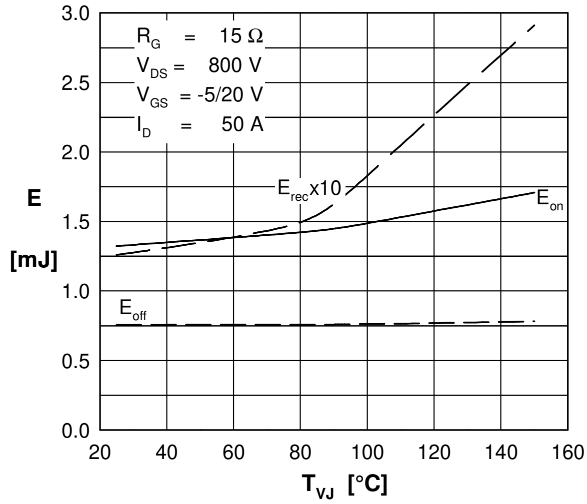

Fig. 14 Typical switching energy versus temperature

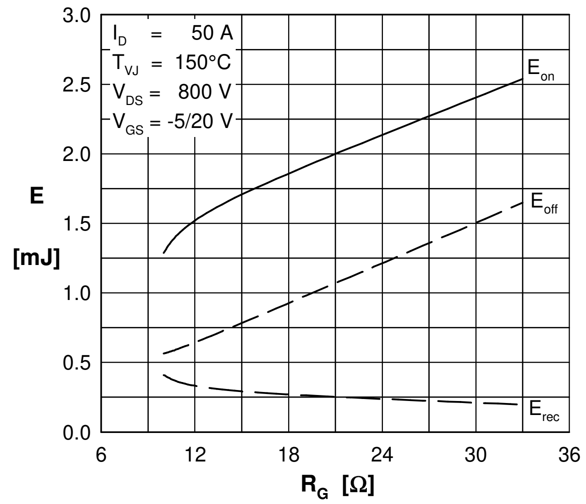

Fig. 15 Typical switching energy versus external gate resistor

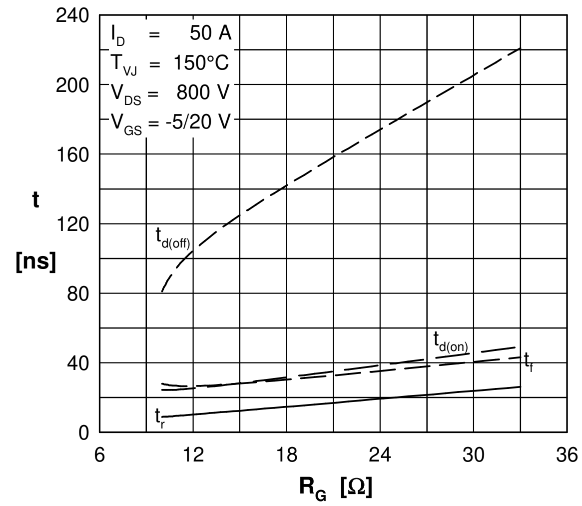

Fig. 16 Typical switching time versus external gate resistor

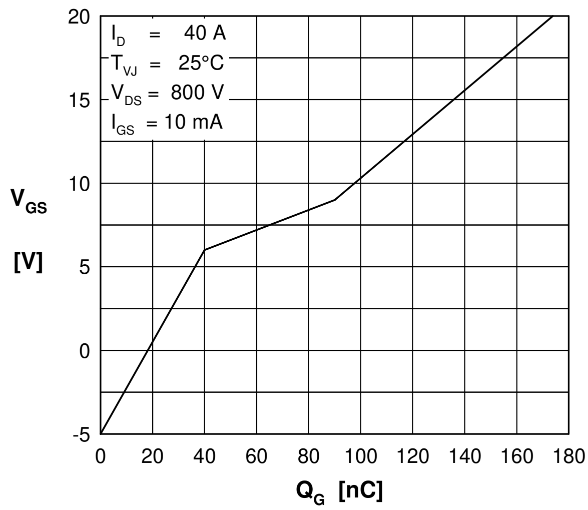

Fig. 17 Typical turn on gate charge, trendline

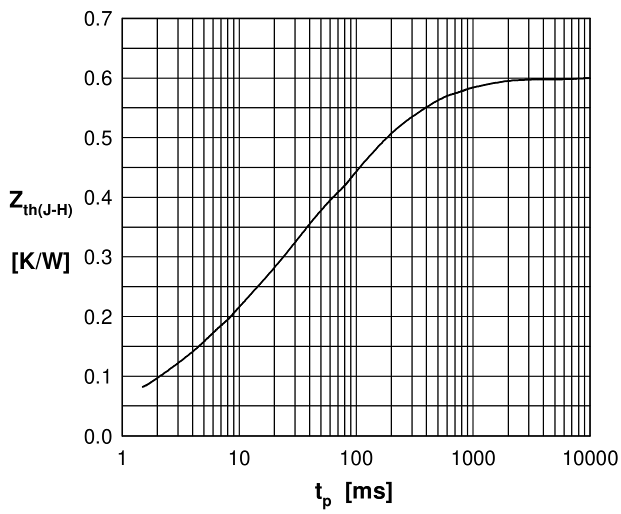

Fig. 18 Typical transient thermal impedance

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