T1M320120K

SiC N-MOSFET 1200V, 320mΩ, 7.6A

Features

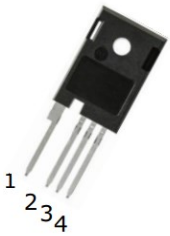
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Avalanche Ruggednes

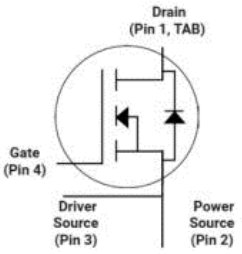
Product Summary

V_{DS}	1200V
$R_{DS(on)\_typ}$	320mΩ
I_D	7.6A

Applications

- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC-DC Converters
- Batterry Chargers





RoHS

Halogen Free

Package Marking and Ordering Information

Part #	Marking	Package
T1M320120K	1M320120K	TO-247-4

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	1200	V
Continuous drain current T_C = 25°C， V_{GS} = 18V T_C = 100°C， V_{GS} = 18V	I_D	 7.6 5.5	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	20	A
Gate-Source voltage	V_{GS}	-4/+18	V
Gate-Source voltage（Absolute maximum values）	V_{GSmax}	-8/+22	V
Power dissipation (T_C = 25°C)	Ptot	60	W
Operating junction and storage temperature	Tj , Tstg	-55...+175	°C

•Example of acceptable V_{GS} waveform

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case. Max	R_{thJC}	2.50	°C/W
Thermal resistance, junction – ambient. Max	R_{thJA}	40	

Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Static Characteristic						
Drain-source breakdown voltage	BV_{DSS}	1200	-	-	V	V_{GS}=0V, I_D=100uA
Gate threshold voltage	$V_{GS(th)}$	2	3.1	4	V	V_{DS}=V_{GS},I_D=1mA
Zero gate voltage drain current	I_{DSS}	-	1	20	μA	V_{DS}=1200V,V_{GS}=0V, T_C=25°C
		-	5	-		T_C=175°C
Gate-source leakage current	I_{GSS}	-		100	nA	V_{GS}=18V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	320	450	mΩ	V_{GS}=18V, I_D=3.6A, T_J=25°C
		-	480	-		TJ=175°C
Transconductance	g_{fs}	-	3	-	S	V_{DS}=20V,I_D=3.6A

Dynamic Characteristic

Input Capacitance	C_{iss}	-	324	-	pF	V_{DS} = 1000V V_{GS} = 0V T_J = 25°C V_{AC} = 25mV f = 1MHz
Output Capacitance	C_{oss}	-	24	-		
Reverse Transfer Capacitance	C_{rss}	-	4	-		
Gate Total Charge	Q_G	-	23.5	-	nC	V_{DS} = 800V V_{GS} = 0/18V I_D = 3.6A I_G = 10mA
Gate-Source charge	Q_{gs}	-	3.2	-		
Gate-Drain charge	Q_{gd}	-	14	-		
Turn-On Switching Energy	E_{ON}	-	9	-	μJ	V_{DD}=800V, V_{GS}=-4/18V R_G=5Ω, I_D=3.6A Inductive Load, T_J=25°C
Turn-Off Switching Energy	E_{OFF}	-	140	-		
Turn-on delay time	$t_{d(on)}$	-	10.9	-	ns	
Rise time	t_r	-	16.2	-		
Turn-off delay time	$t_{d(off)}$	-	11.2	-		
Fall time	t_f	-	30.4	-		
Gate resistance	R_G	-	5.9	-	Ω	V_{AC} = 25mV, f=1MHz

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}		3.6		V	V_{GS}= 0V,I_{SD}=4A, T_J=25°C
			3.2			V_{GS}= 0V,I_{SD}=4A, T_J=175°C
Body Diode Reverse Recovery Time	t_{rr}	-	12.3	-	ns	V_R = 800V, V_{GS} = 0V I_D = 3.6A di/dt = 800A/μS T_J = 25°C
Body Diode Reverse Recovery Charge	Q_{rr}	-	23.5	-	nC	

Typical Performance Characteristics

Fig 1. Output Characteristic (T_J=-55℃)

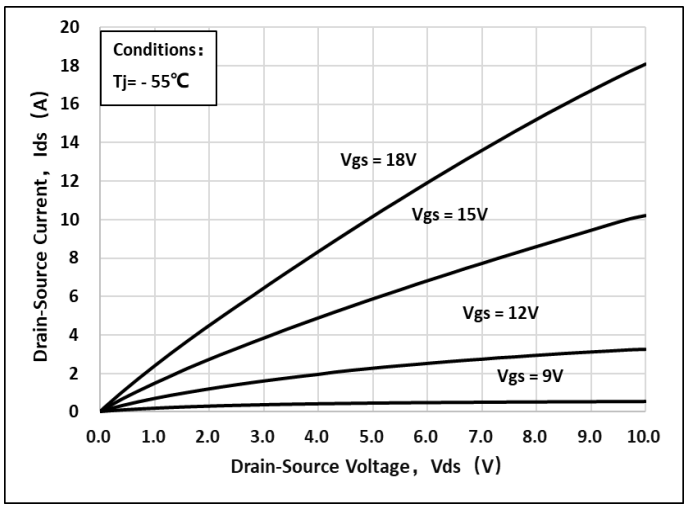


Fig 2. Output Characteristic (T_J=25℃)

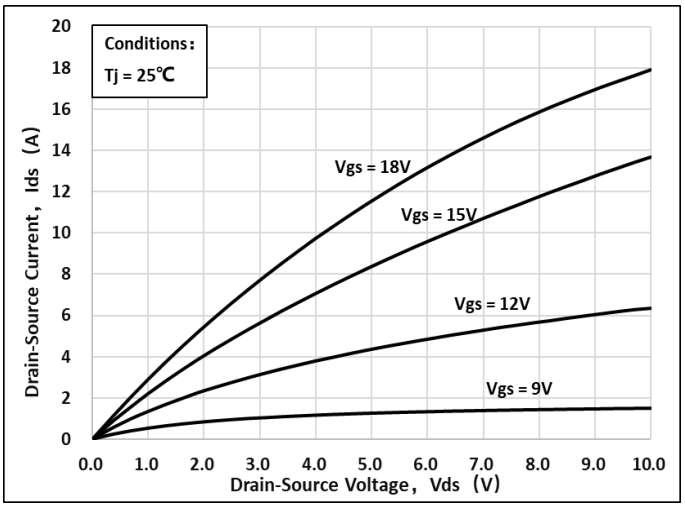


Fig 3. Output Characteristic (T_J=175℃)

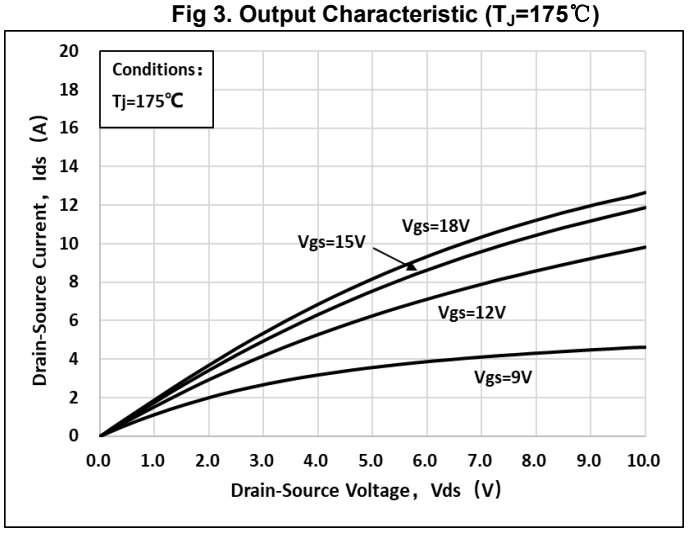


Fig 4: Rdson Vs Ids Characteristic

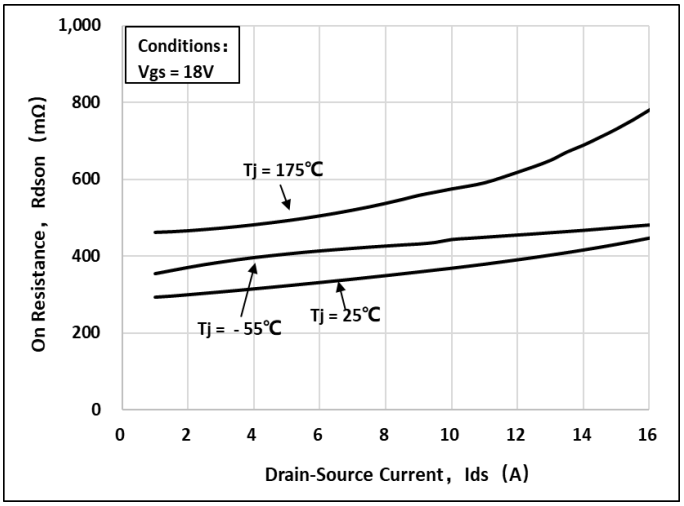


Fig 5: Rds(on) vs. Temperature

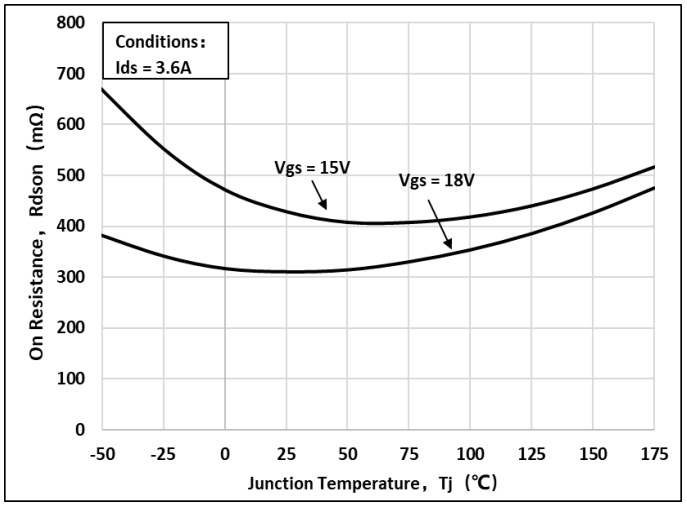


Fig 6: Transfer Characteristic

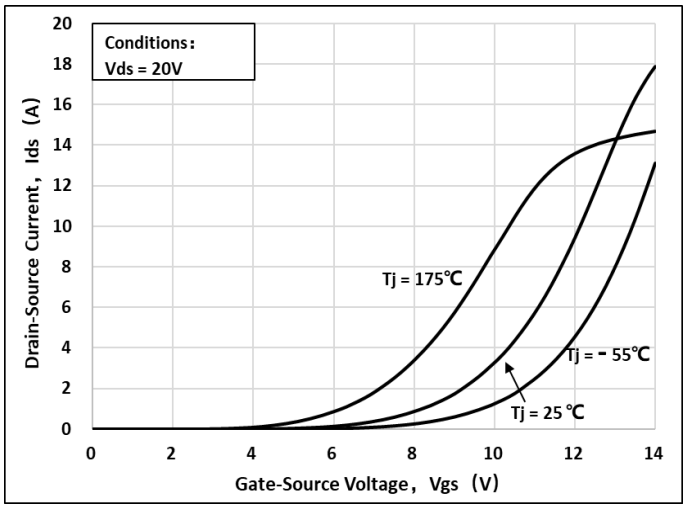


Fig 7: Body-diode Characteristic (T_J=-55℃)

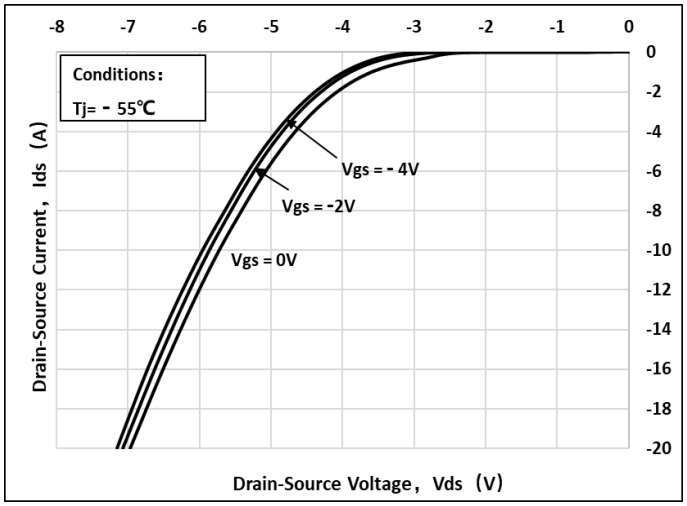


Fig 8: Body-diode Characteristic (T_J=25℃)

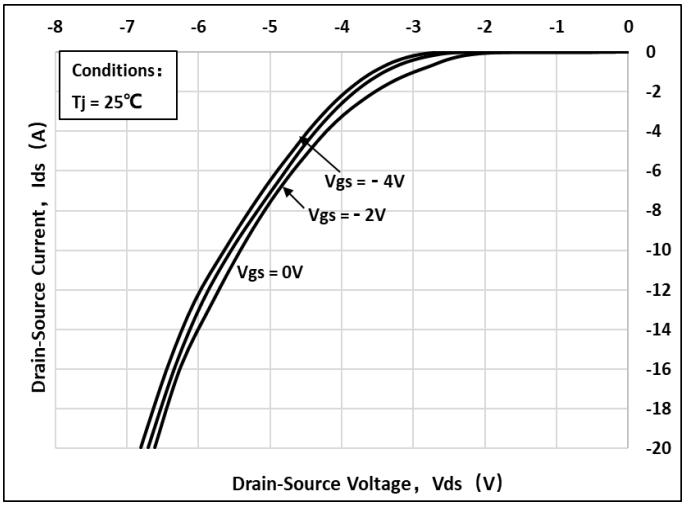


Fig 9: Body-diode Characteristic (T_J=175℃)

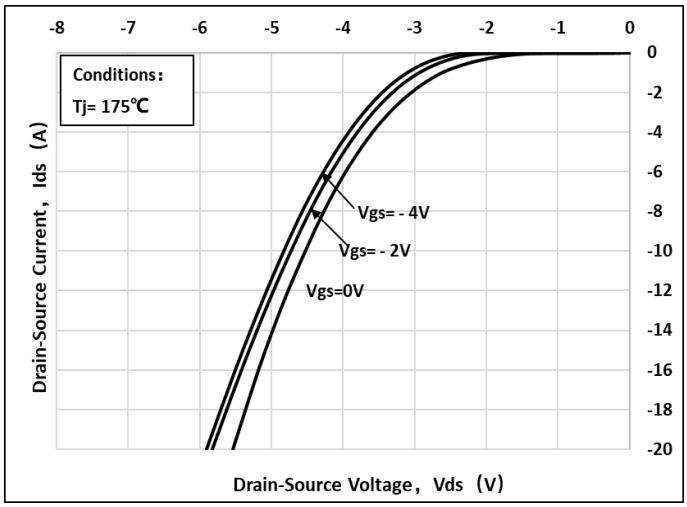


Fig 10: V_{TH} Vs T_J Temperature Characteristic

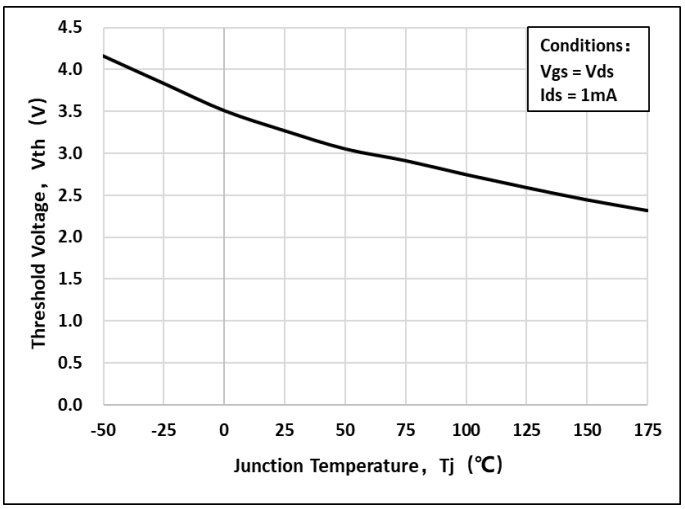


Fig 11: Gate Charge Characteristics

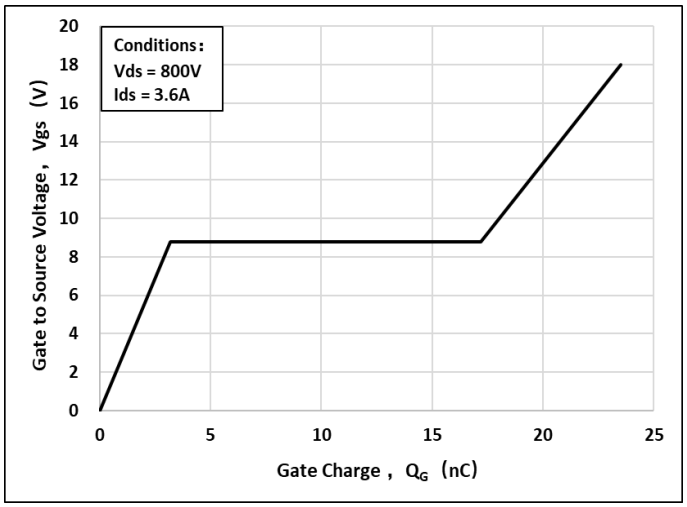


Fig 12: 3rd Quadrant Characteristic(T_J=-55℃)

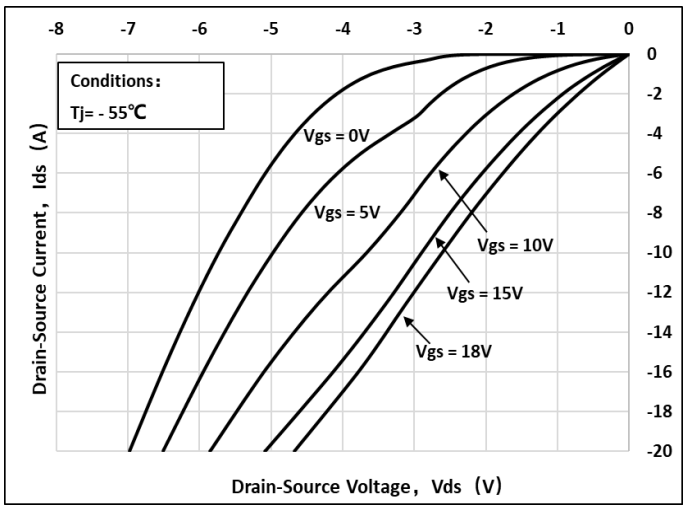


Fig 13: 3rd Quadrant Characteristic(T_J=25℃)

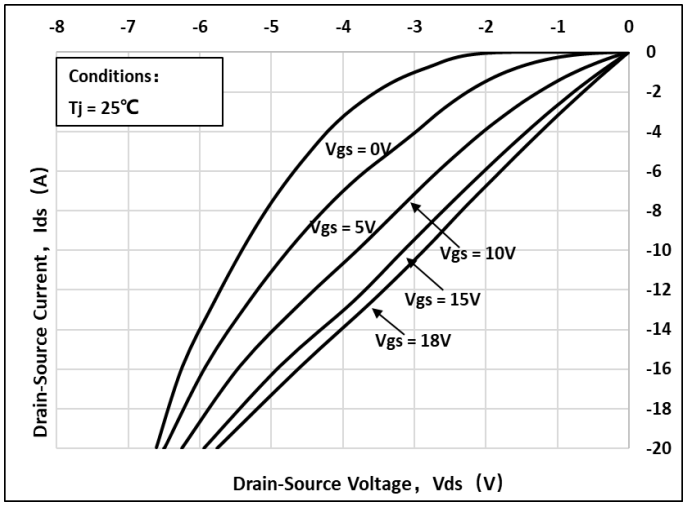


Fig 14: 3rd Quadrant Characteristic(T_J=175℃)

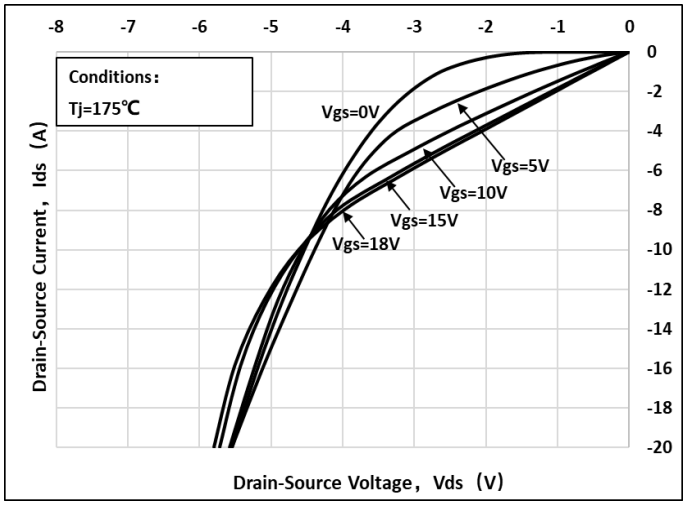


Fig 15: Capacitance Characteristic

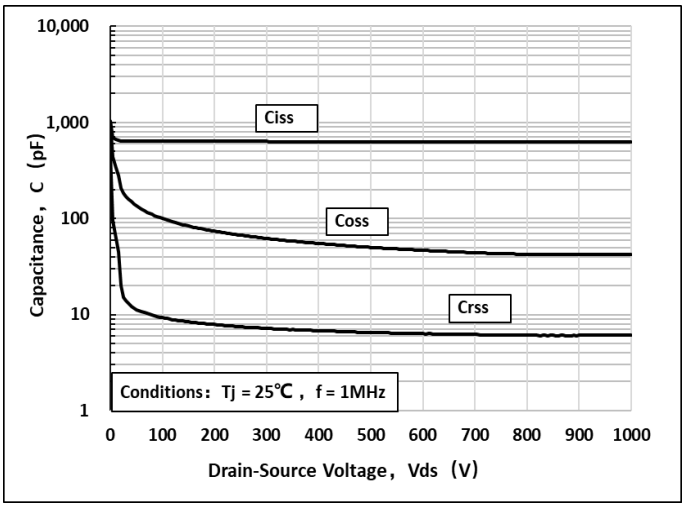


Fig 16: Safe Operating Area

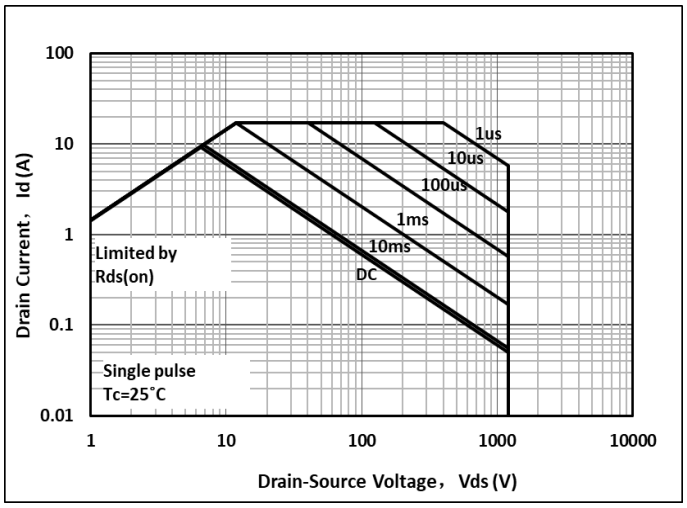
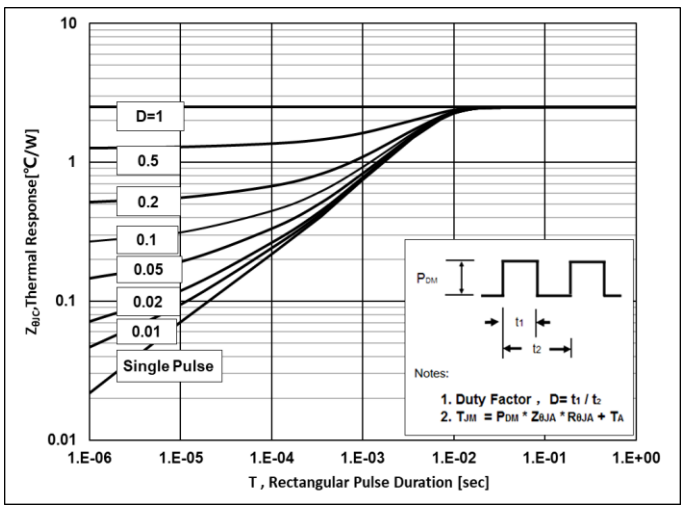


Fig 17: Transient Thermal Impedance



Test Circuit & Waveform

Figure A. Definition of switching times

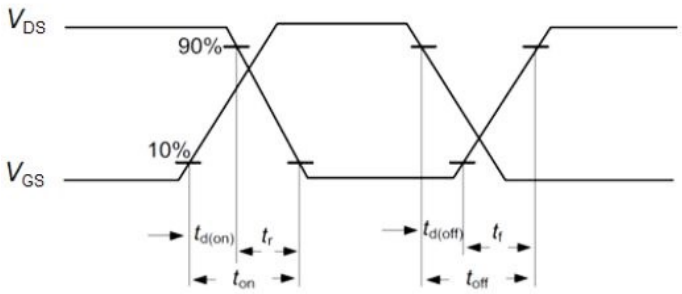


Figure B. Dynamic test circuit

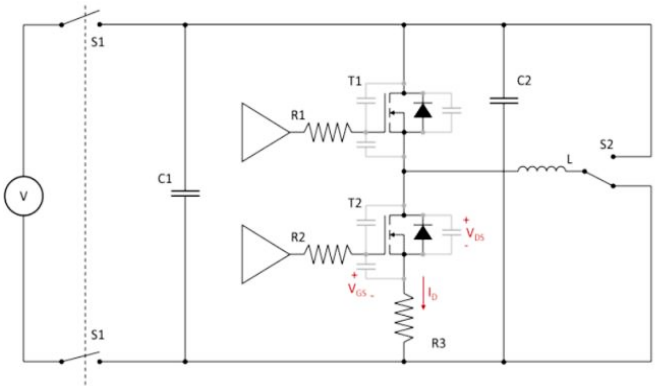


Figure C. Definition of body diodeswitching characteristics

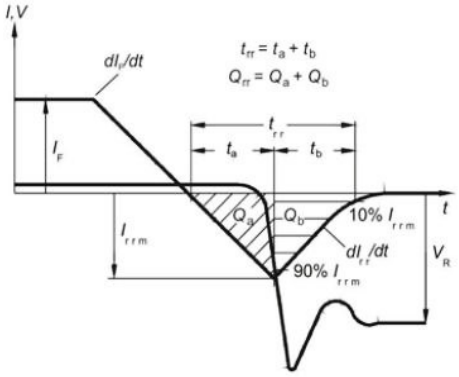
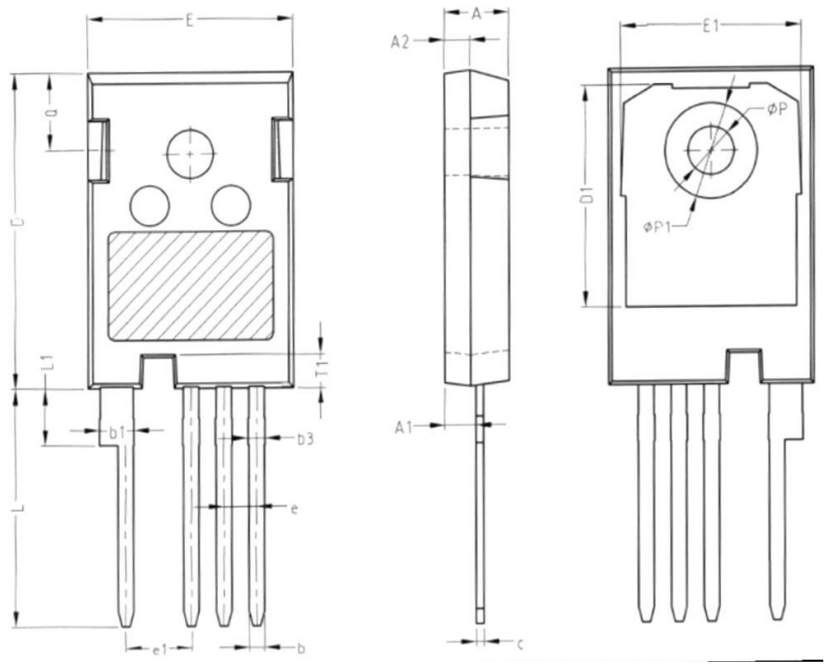


Figure C. **Definition of diode switching characteristics**

Package Outline:



COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.61
A2	1.80	2.00	2.20
b	1.06	1.21	1.36
b1	2.33	2.63	2.93
b3	1.07	1.30	1.60
c	0.51	0.61	0.75
D	23.30	23.45	23.60
D1	16.25	16.55	16.85
E	15.74	15.94	16.14
E1	13.72	14.02	14.32
T1	2.35	2.50	2.65
e	2.54 BSC		
e1	5.08 BSC		
Q	5.49	5.79	6.09
L	17.27	17.57	17.87
L1	3.99	4.19	4.39
Φp	3.40	3.60	3.80
Φp1	7.19 REF		

Contact Information

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