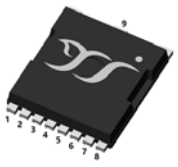
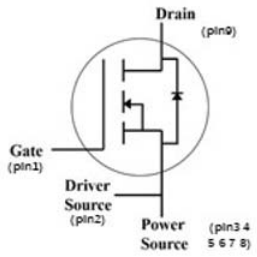
Silicon Carbide Power MOSFET （N-Channel Enhancement）

V_{DS}	650V
$I_{D\ (25°C)}$	92A
$R_{DS(on)}$	20mΩ





Features

- High speed switching
- Essentially no switching losses
- Reduction of heat sink requirements
- Maximum working temperature at 175 °C
- High blocking voltage
- Fast Intrinsic diode with low recovery current
- High-frequency operation
- Halogen free, RoHS compliant

Typical Applications

Typical applications are in power factor correction(PFC), solar inverter, uninterruptible power supply, motor drives, photovoltaic inverter, electric car and charger.

Mechanical Data

- **Package**: TOLL
- **Terminals**: Tin plated leads
- **Polarity**: As marked

■Maximum Ratings (T_C=25℃ Unless otherwise specified）

PARAMTETER	SYMBOL	UNIT	VALUE	TEST CONDITIONS	NOTE
Device marking code			D206520TLGH		
Drain source voltage @ T_j=25°C	$V_{DS,max}$	V	650	V_{GS}=0 V, I_D=100uA	
Gate source voltage @ T_j=25°C	$V_{GS,max}$	V	-10/+25	Absolute maximum values (AC f > 1Hz, duty cycle < 1%)	Note1
Gate source voltage @ T_j=25°C	$V_{GS,op}$	V	-5/+20	Recommended operational values	
Continuous drain current @ T_c=25°C	I_D	A	92	V_{GS}=20V, Tc=25℃	Fig.14
Continuous drain current @ T_c=110°C			59	V_{GS}=20V, Tc=110℃	
Pulse Drain Current	$I_{D,\ pulse}$	A	319	Limited by t_{pw}	Fig.19
Avalanche energy, Single Pulse	E_{AS}	J	1	V_{DD}=75V, L=30mH	
Power Dissipation	P_{TOT}	W	263	T_c=25°C , Tj = 175℃	Fig.13
Operating junction and Storage temperature range	Tj ,Tstg	°C	-55 to +175		
Soldering temperature	T_L	°C	260	1.6mm (0.063") from case for 10s	

■Static Electrical Characteristics（Tc=25℃ unless otherwise specified ）

PARAMTETER	SYMBOL	UNIT	Min.	Typ.	Max.	Test Conditions	Note
Gate threshold voltage	$V_{GS(th)}$	V	1.5	2.8	4.0	V_{DS}=V_{GS}, I_D= 50mA	Fig.7,15
Drain source breakdown voltage	$V_{(BR)DSS}$	V	650			V_{GS}=0, I_D=100uA	
Zero gate voltage drain current	I_{DSS}	uA		<1	100	V_{DS}=650V, V_{GS}= 0V	
				10	500	V_{DS}=650V, V_{GS}= 0V, Tj= 175℃	
Gate source leakage current	I_{GSS}	nA			250	V_{GS}= 20V, V_{DS}=0V	
Current drain source on-state resistance	$R_{DS\ ON}$	mΩ		20	26	V_{GS}=20V, I_D=50A	Fig.4,5,6
				30		V_{GS}=20V, I_D=50A,Tj=175℃	
Transconductance	g_f	S		23.5		V_{DS}=20V,I_D=50A	Fig.7

■Dynamic Electrical Characteristics（Tc=25℃ unless otherwise specified ）

PARAMTETER	SYMBOL	UNIT	Min.	Typ.	Max.	Test Conditions	Note
Input capacitance	Ciss	pF		5026		V_{DS}=400V, V_{GS}=0V, Tj=25℃, f=1MHz, V_{AC}= 25mV	Fig.11
Output capacitance	Coss			352			
Reverse capacitance	Crss			49			
Coss stored energy	Eoss	uJ		32			Fig.12
Gate source charge	Qgs	nC		82.5		V_{DS}=400V, V_{GS}=-5/20V, I_D=50A	Fig.16
Gate drain charge	Qgd			116.1			
Gate charge	Qg			300.1			
Short-Circuit Withstand Time	t_{sc}	us		1.6		Rg=30Ω,I_{sc}=920A, VGS=-5/20V,VDD=400V	
Internal Gate Resistance	$R_{G(int)}$	Ω		1.7		f =1MHz, V_{AC}= 25mV	

■Switching Characteristics（Tc=25℃ unless otherwise specified ）

PARAMTETER	SYMBOL	UNIT	Min.	Typ.	Max.	Test Conditions	Note
Turn on delay time	$t_{d(on)}$	ns		11		V_{DD}=400V, V_{GS}=-5/+20V, I_D=50A, L=100uH, $R_{G(ext)}$= 2.7Ω	Fig.17,18,22
Rise time	t_r			27.8			
Turn off delay time	$t_{d(off)}$			36			
Fall time	t_f			14			
Turn on switching energy	Eon	uJ		320			
Turn off switching energy	Eoff			167			

■Body diode characteristics（Tc=25℃ unless otherwise specified ）

PARAMTETER	SYMBOL	UNIT	Min.	Typ.	Max.	Test Conditions	Note
Diode forward voltage	V_{SD}	V		4.1		V_{GS}=0V,I_{SD}=25A	Fig.8
Continuous diode forward current	I_S	A		51		V_{GS}=0V,Tc=25℃	
Reverse recovery time	trr	nS		46		V_{DS}=400V, V_{GS}=0V, I_{SD}=25A, di/dt=300A/uS	
Reverse recovery charge	Qrr	nC		208.1			
Peak reverse recovery current	Irrm	A		6.1			

Note 1: When using SiC Body Diode the maximun recommended V_{GS} = -5V

■Thermal Characteristics （T_a=25℃ Unless otherwise specified）

PARAMETER	SYMBOL	UNIT	Value
Thermal resistance	$R_{\theta J\text{-}C}$	°C /W	0.57

■Typical Characteristics

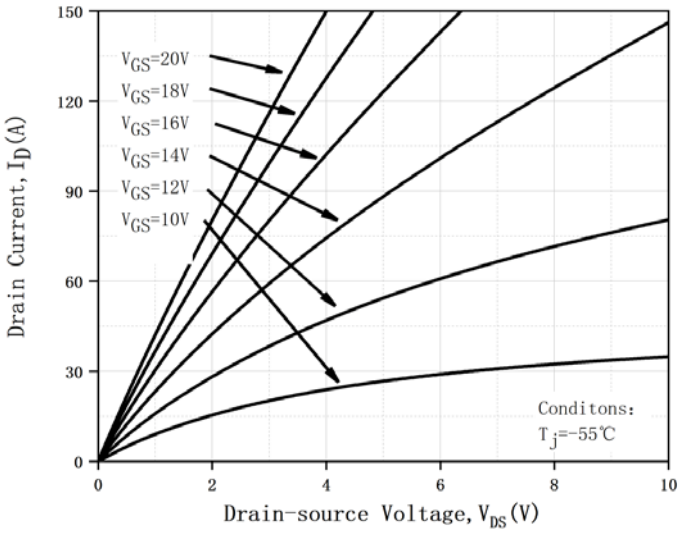


Figure 1. Output Characteristics Tj = -55℃

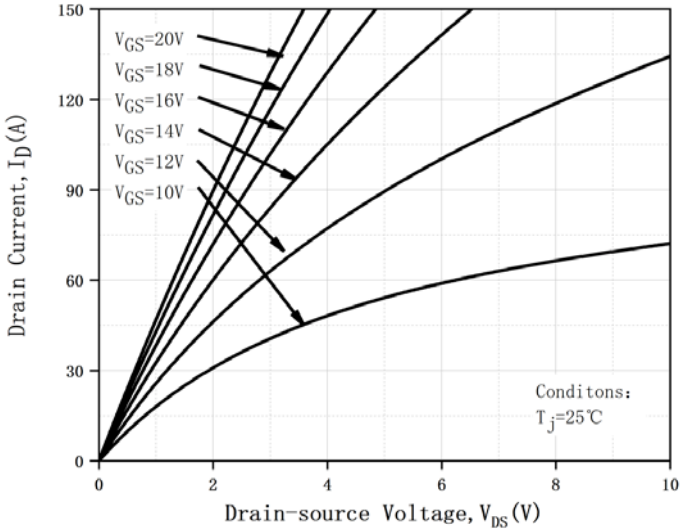


Figure2. Output Characteristics Tj = 25℃

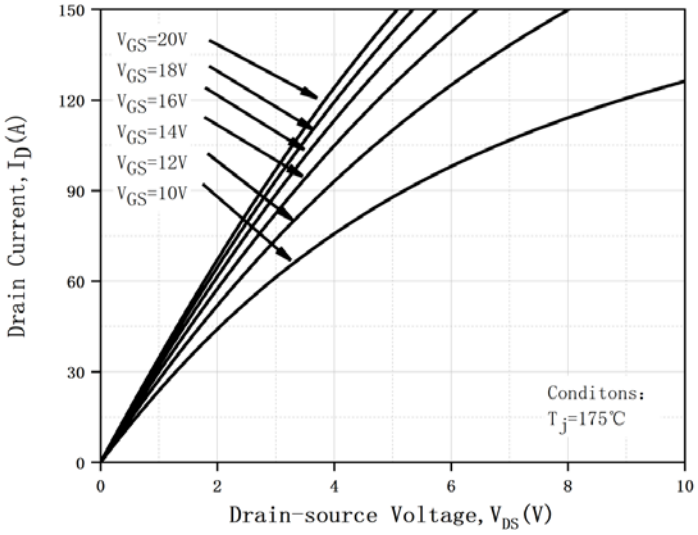


Figure 3. Output Characteristics Tj = 175℃

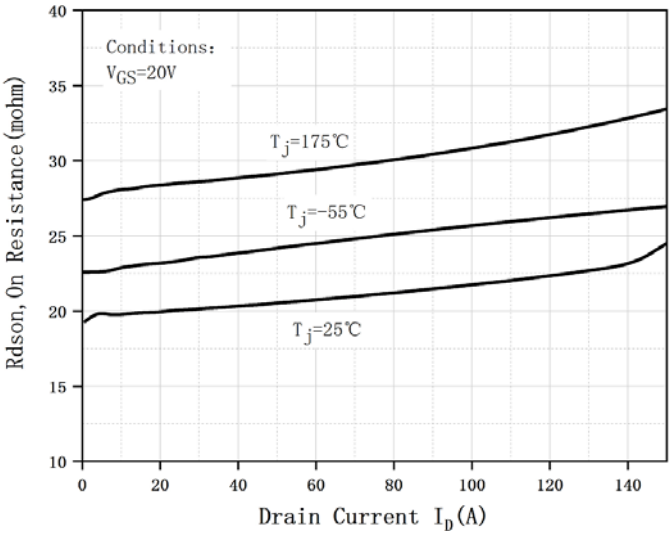


Figure 4. On-resistance vs. drain current

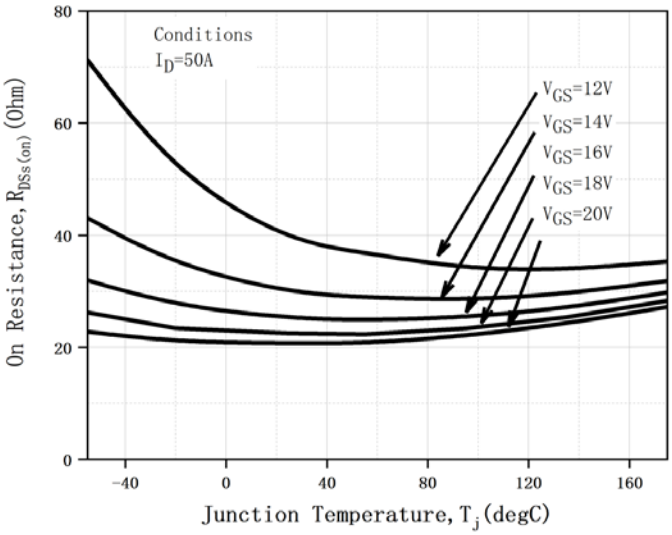


Figure 5. On-resistance vs. Tj for various gate voltage

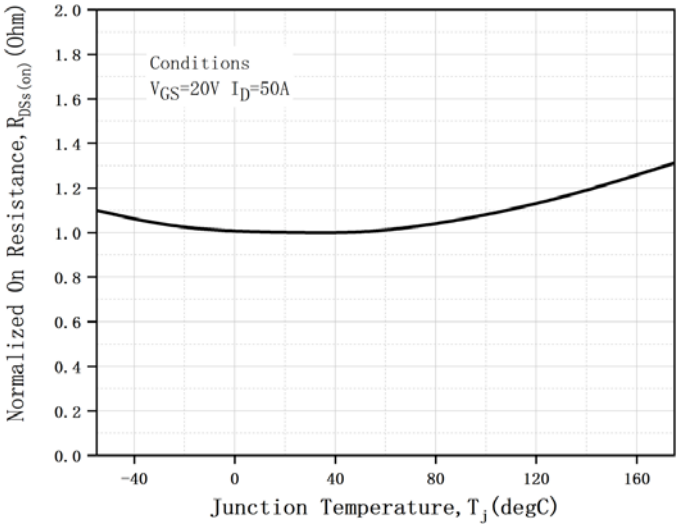


Figure 6. Normalized On-Resistance vs.Temperature

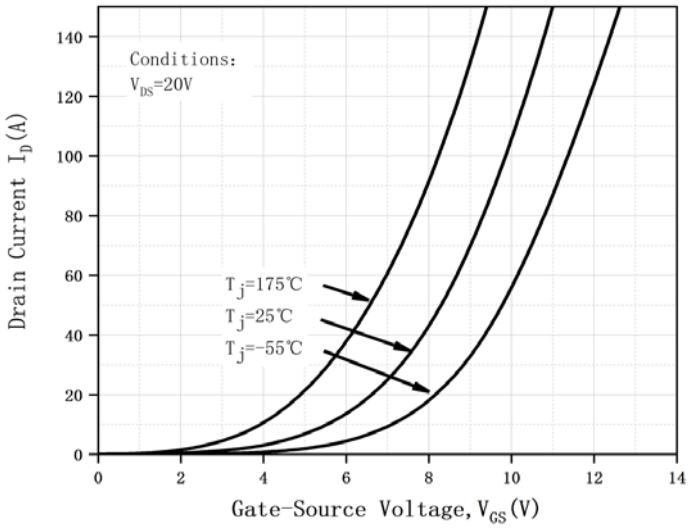


Figure 7. Transfer Characteristics for various Tj

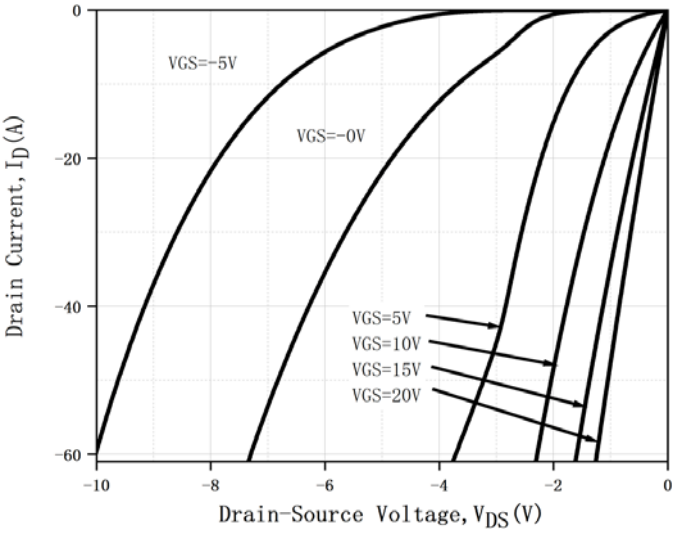


Figure 8. Reverse Output Characteristics at Tj = -55°C

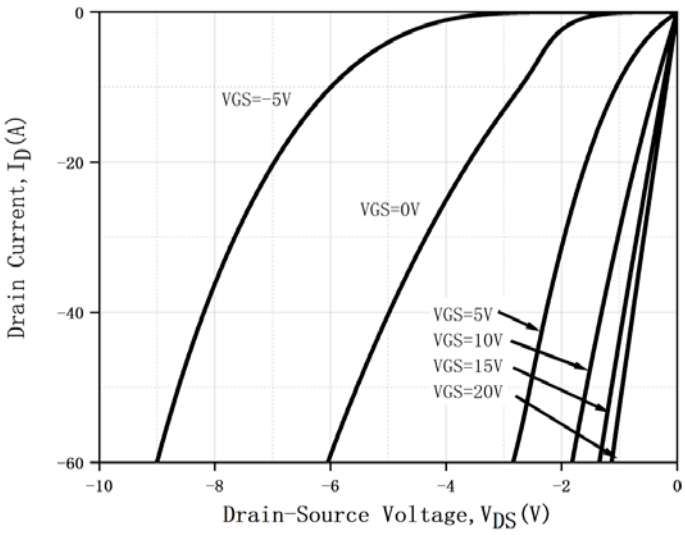


Figure 9. Reverse Output Characteristics at Tj = 25°C

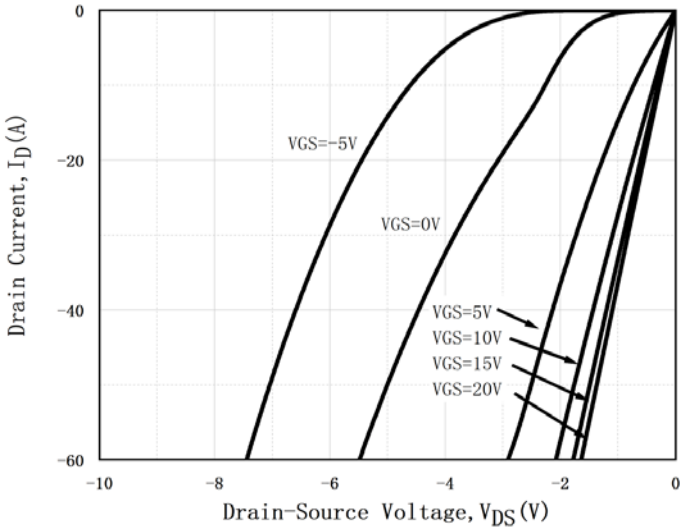


Figure 10. Reverse Output Characteristics at Tj = 175°C

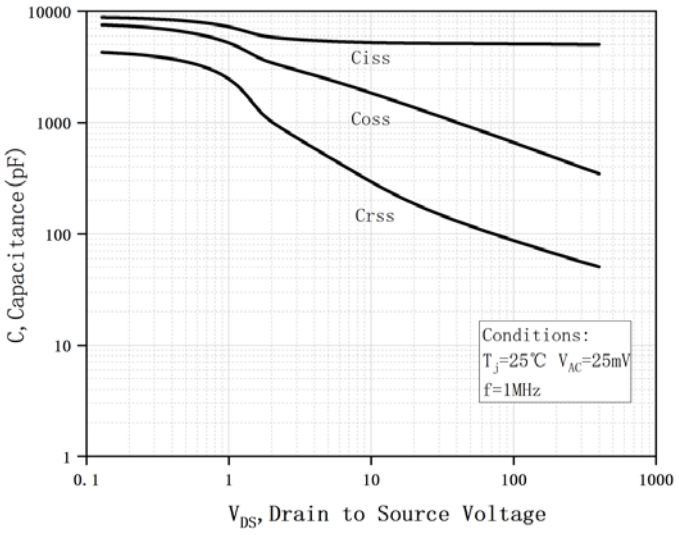


Figure 11. Capacitances vs. Drain to Source Voltage

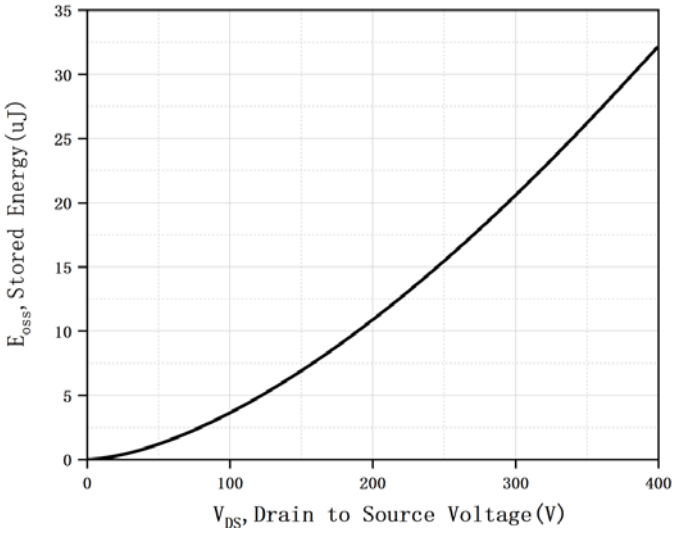


Figure 12. Output Capacitor Stored Energy

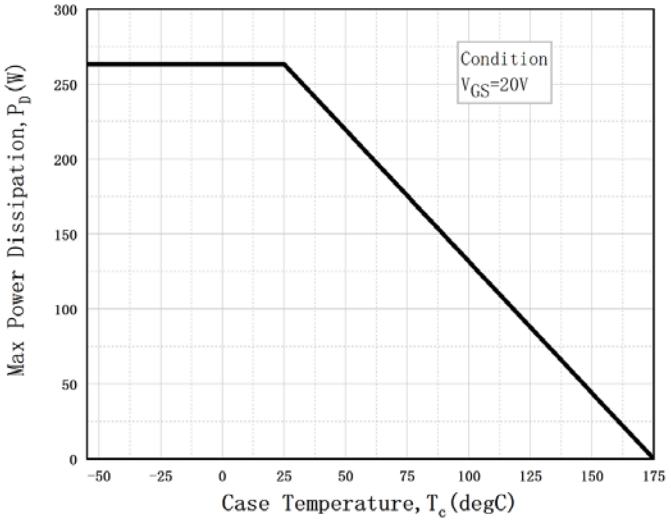


Figure 13. Maximum Power Dissipation Derating vs. Case Temperature

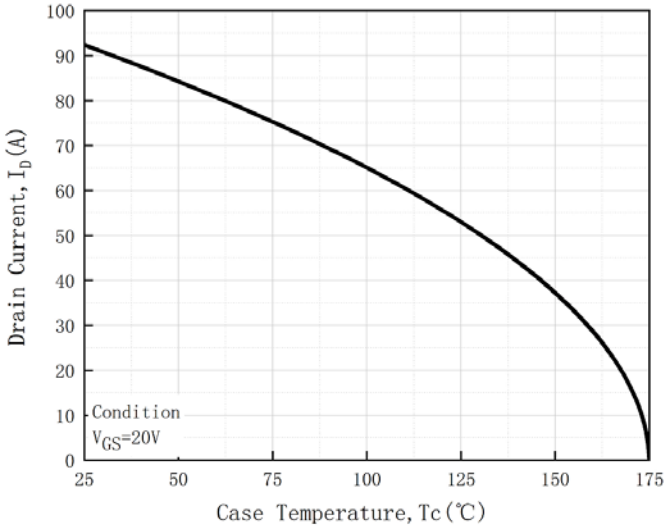


Figure 14. Drain Current vs. Case Temperature

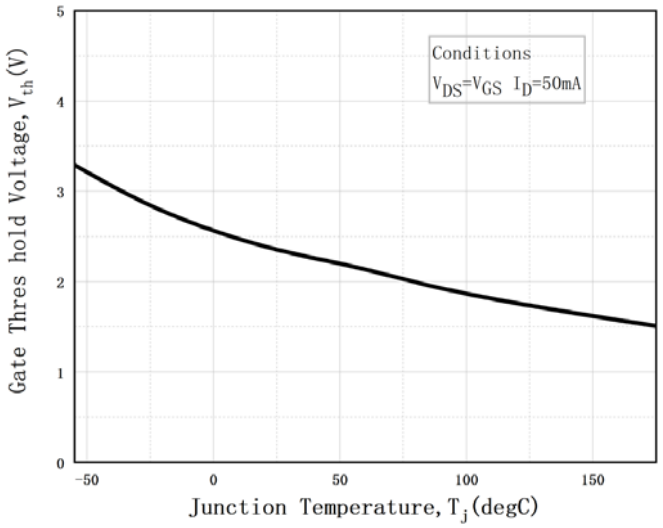


Figure 15. Threshold voltage vs.temperature

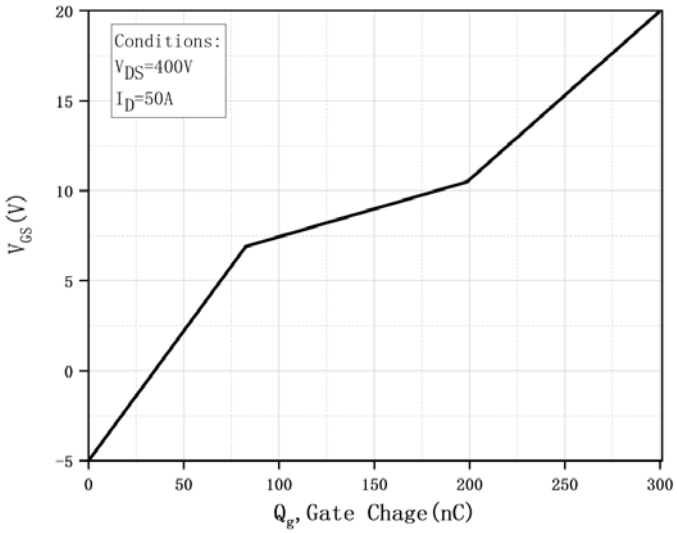


Figure 16. Gate Charge Characteristics

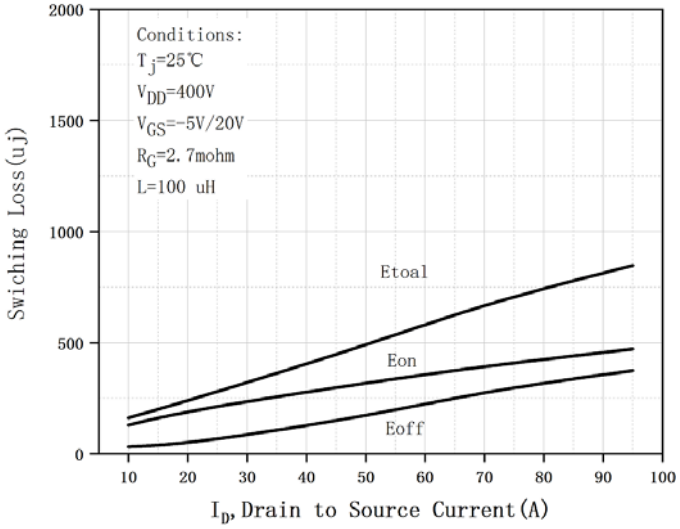


Figure 17. Clamped Inductive Switching Energy vs. Drain Current

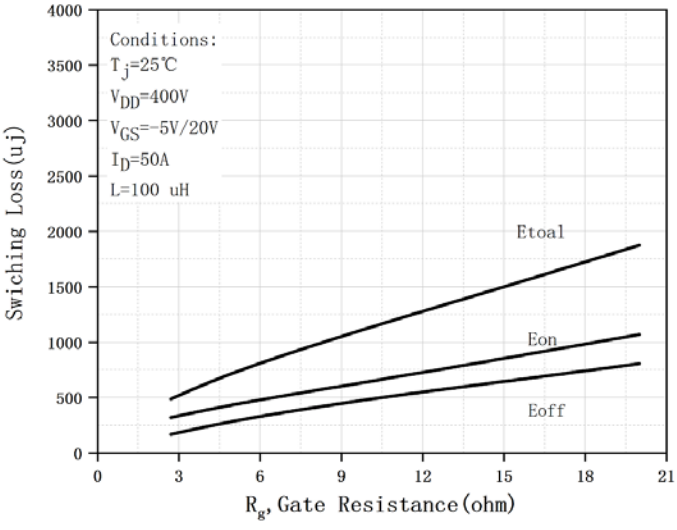


Figure 18. Clamped Inductive Switching Energy vs. External Gate Resistor (R_G(ext.))

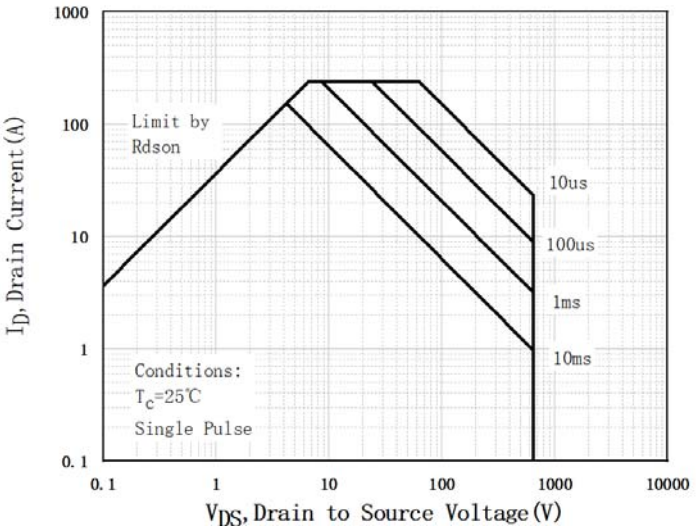


Figure 19. Safe Operating Area

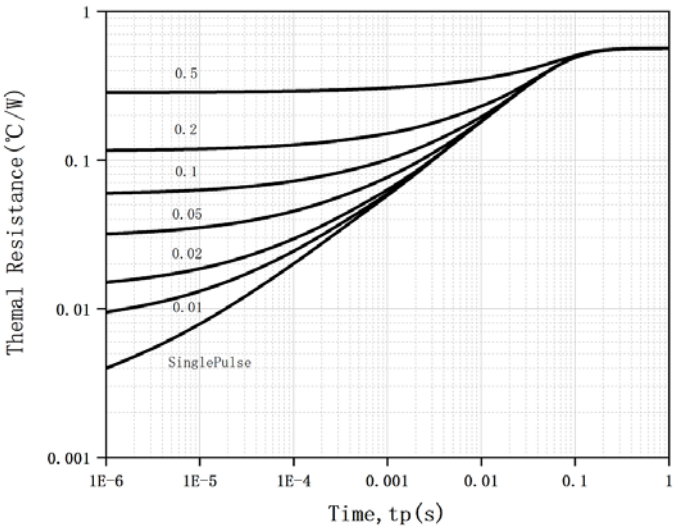


Figure 20. Transient Junction to Case Thermal Impedance

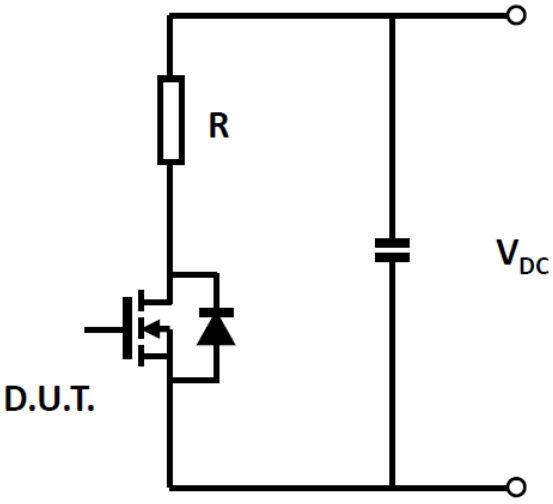


Figure 21. Schematic of Resistive Switching

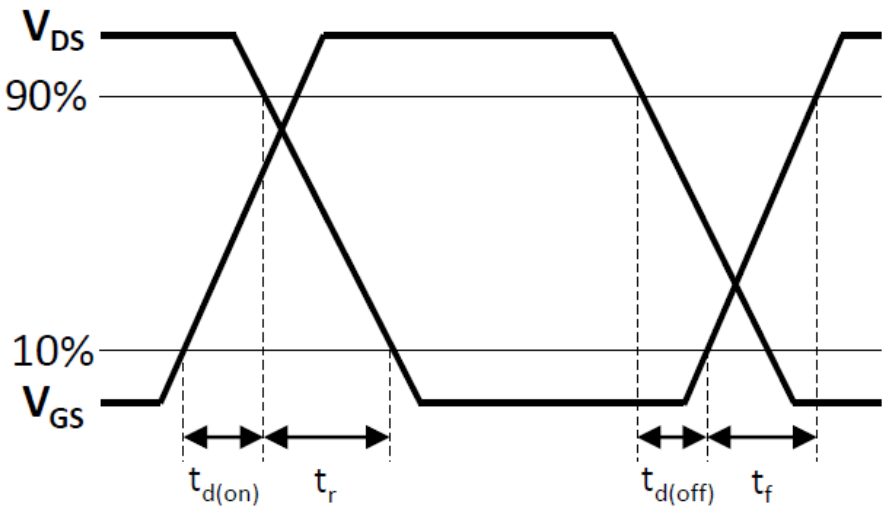
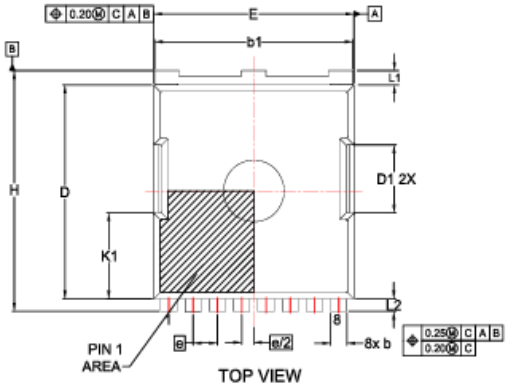
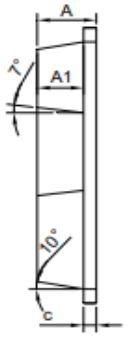


Figure 22. Switching Times Definition

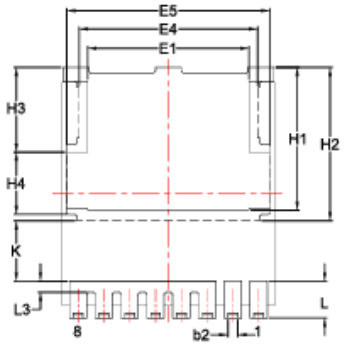
■Outline Dimensions



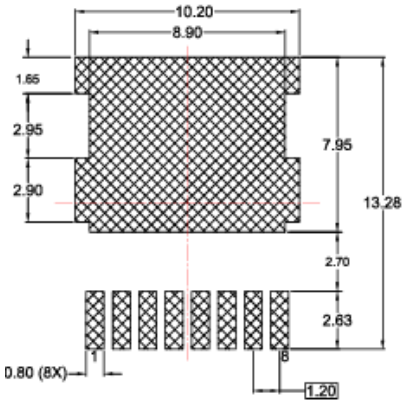
TOP VIEW



SIDE VIEW



BOTTOM VIEW



RECOMMENDED LAND PATTERN

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	2.20	2.3	2.40
A1	1.70	1.80	1.90
b	0.70	0.80	0.90
b1	0.70	0.80	0.90
b2	0.36	0.46	0.56
c	0.40	0.50	0.60
D	10.28	10.38	10.48
D1		3.30	
E	9.80	9.90	10.00
E1	8.0	8.10	8.20
E4		8.40	
E5		9.40	
e		1.20 BSC	
e2		0.60 BSC	
H	11.58	11.68	11.78
H1	6.56	6.66	6.76
H2	7.05	7.15	7.25
H3		3.50	
H4		3.25	
K	2.70	2.80	2.90
K1		4.18	
L	1.63	1.73	1.83
L1	0.60	0.70	0.80
L2	0.50	0.60	0.70
L3	0.30	0.40	0.50
E		8 REF	

Disclaimer

The information presented in this document is for reference only. Yangzhou Yangjie Electronic Technology Co., Ltd. reserves the right to make changes without notice for the specification of the products displayed herein to improve reliability, function or design or otherwise.

The product listed herein is designed to be used with ordinary electronic equipment or devices, and not designed to be used with equipment or devices which require high level of reliability and the malfunction of with would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), Yangjie or anyone on its behalf, assumes no responsibility or liability for any damages resulting from such improper use of sale.

This publication supersedes & replaces all information previously supplied. For additional information, please visit our website http:// www.21yangjie.com , or consult your nearest Yangjie's sales office for further assistance.