ASMC070T125N1

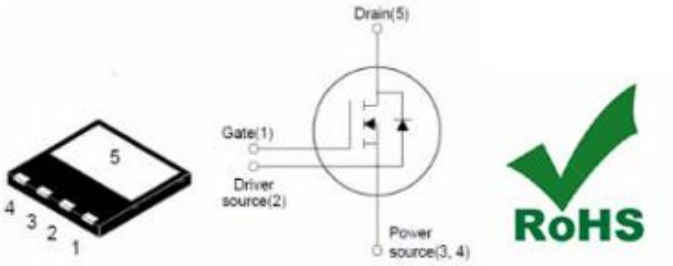
700V, 21A, 125mΩ SiCMOSFET

N-Channel SiC Power MOSFET G3 MOSFET Technology

Features

- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitance
- Easy to Parallel and Simple to Drive
- 15V / 0V V_{GS} compatible with most flyback controllers

Package



Benefits

- Higher System Efficiency
- Reduced Cooling Requirements
- Increased Power Density
- Increased System Switching Frequency
- Reduction of heat sink requirements

Applications

- Power factor correction（PFC）
- Switched mode power supplies(SMPS)
- High voltage DC/DC converters
- Adapter
- LED/LCD/PDP TV and monitor Lighting

Part Number	Package	Marking
ASMC070T125N1	DFN8*8	ASMC070T125N1

Maximum Ratings (T_C=25℃ unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{DSmax}	Drain-Source Voltage	700	V	V_{GS}=0V, I_D=100μA	
V_{GSmax}	Gate-Source Voltage	-10/+23	V	Absolute maximum values	
V_{GSop}	Gate-Source Voltage	-5…0/+15…+18	V	Recommended operational values	
I_D	Continuous Drain Current	19	A	V_{GS}=15V, T_c=25℃	Fig. 19
		13.3		V_{GS}=15V, T_c=100℃	
		21		V_{GS}=18V, T_c=25℃	
		15		V_{GS}=18V, T_c=100℃	
$I_{D(pulse)}$	Pulsed Drain Current	43	A	Pulse width t_p limited by T_{Jmax}	
P_D	Power Dissipation	62	W	T_C=25℃, T_J=175℃	Fig. 20
T_J, T_{STG}	Operating Junction and Storage Temperature	-55 to +175	℃		
T_L	Solder Temperature, 1.6mm from case for 10s	260	℃		

Electrical Characteristics (T_C=25℃ unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	700	/	/	V	V_{GS}=0V, I_D=100μA	
$V_{GS(th)}$	Gate Threshold Voltage	2.4	3.2	4.0	V	V_{DS}=V_{GS}, I_D=2mA	Fig. 11
		/	2.4	/		V_{DS}=V_{GS}, I_D=2mA, T_J=175℃	
I_{DSS}	Zero Gate Voltage Drain Current	/	1	10	μA	V_{DS}=700V, V_{GS}=0V	
I_{GSS+}	Gate-Source Leakage Current	/	10	50	nA	V_{DS}=0V, V_{GS}=20V	
I_{GSS-}	Gate-Source Leakage Current	/	10	50	nA	V_{DS}=0V, V_{GS}=-8V	
$R_{DS(on)}$	Drain-Source On-State Resistance	/	160	210	mΩ	V_{GS}=15V, I_D=7A	Fig. 4,5,6
		/	175	/	mΩ	V_{GS}=15V, I_D=7A, T_J=175℃	
		/	125	165	mΩ	V_{GS}=18V, I_D=7A	
		/	137	/	mΩ	V_{GS}=18V, I_D=7A, T_J=175℃	
g_{fs}	Transconductance	/	6.2	/	S	V_{DS}=20V, I_{DS}=7A	Fig. 7
		/	5.6	/		V_{DS}=20V, I_{DS}=7A, T_J=175℃	
C_{iss}	Input Capacitance	/	408	/	pF	V_{GS}=0V V_{DS}=400V f=1MHz	Fig. 17,18
C_{oss}	Output Capacitance	/	29	/			
C_{rss}	Reverse Transfer Capacitance	/	2.4	/			
E_{oss}	C_{oss} Stored Energy	/	2.3	/	μJ	V_{AC}=25mV	Fig. 16
E_{ON}	Turn-On Switching Energy	/	24	/	μJ	V_{DS}=400V, V_{GS}=0V/15V I_D=7A, $R_{G(ext)}$=2.5Ω, L=100μH	
E_{OFF}	Turn-Off Switching Energy	/	16	/			
$t_{d(on)}$	Turn-On Delay Time	/	11	/	ns	V_{DS}=400V, V_{GS}=0V/15V, I_D=7A $R_{G(ext)}$=2.5Ω	
t_r	Rise Time	/	8.6	/			
$t_{d(off)}$	Turn-Off Delay Time	/	18.2	/			
t_f	Fall Time	/	14.6	/			
$R_{G(int)}$	Internal Gate Resistance	/	19	/	Ω	f=1MHz, V_{AC}=25mV	
Q_{GS}	Gate to Source Charge	/	4.6	/	nC	V_{DS}=400V V_{GS}=0V/15V I_D=7A	Fig. 12
Q_{GD}	Gate to Drain Charge	/	3.8	/			
Q_G	Total Gate Charge	/	12.6	/			

Reverse Diode Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode Forward Voltage	4.2	/	V	V_{GS}=-5V, I_{SD}=3.5A, T_J=25℃	Fig. 8,9,10
		3.6	/		V_{GS}=-5V, I_{SD}=3.5A, T_J=175℃	
I_S	Continuous Diode Forward Current	/	13	A	T_C=25℃	
t_{rr}	Reverse Recover Time	12	/	ns	V_R=400V, I_{SD}=3.5A	
Q_{rr}	Reverse Recovery Charge	28	/	nC		
I_{rrm}	Peak Reverse Recovery Current	1.8	/	A		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	2.4	/	℃/W		
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	/	40			

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Typical Performance

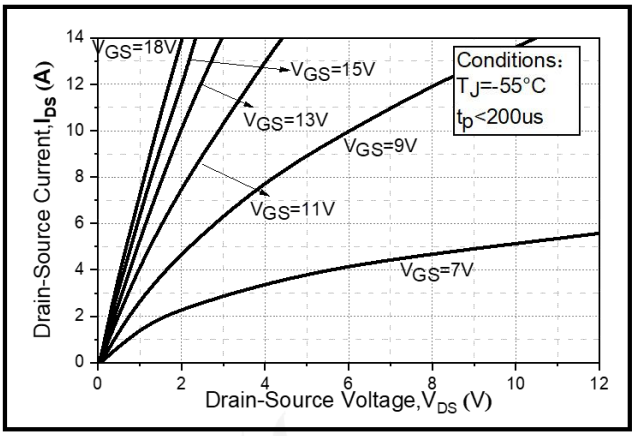


Figure 1. Output Characteristics T_J = -55℃

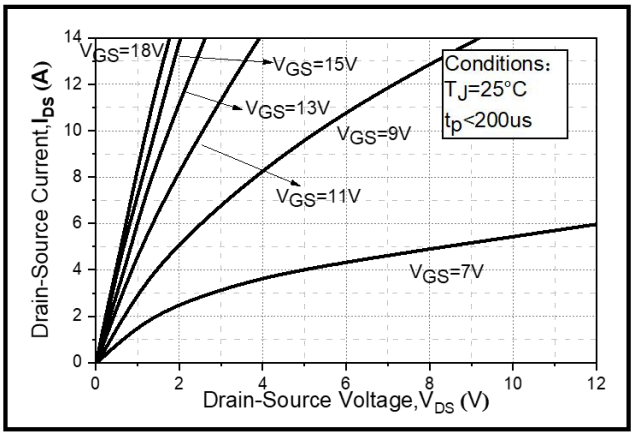


Figure 2. Output Characteristics T_J = 25℃

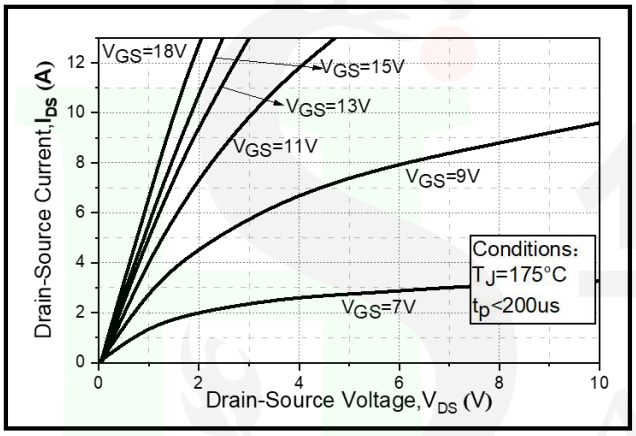


Figure 3. Output Characteristics T_J = 175℃

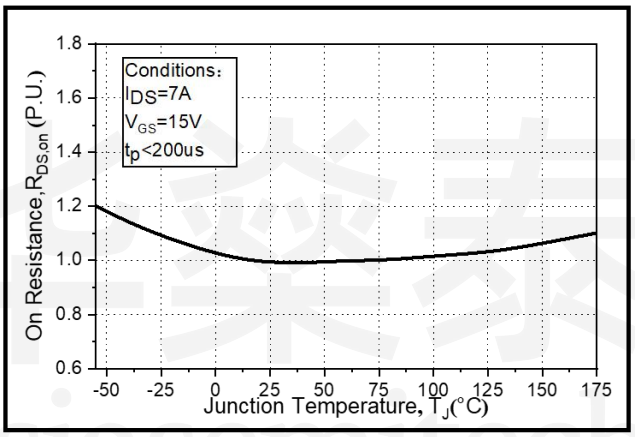


Figure 4. Normalized On-Resistance vs. Temperature

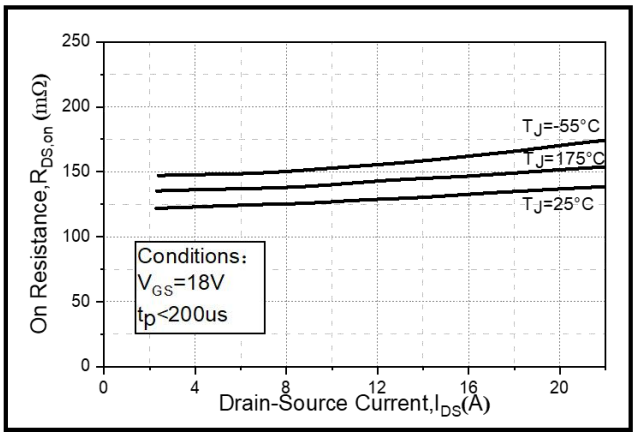


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

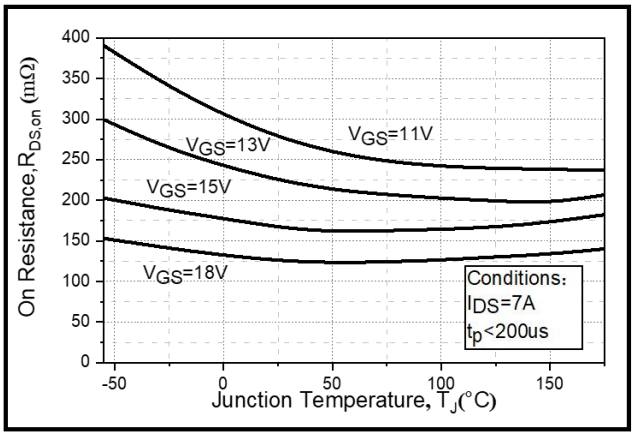


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

Typical Performance

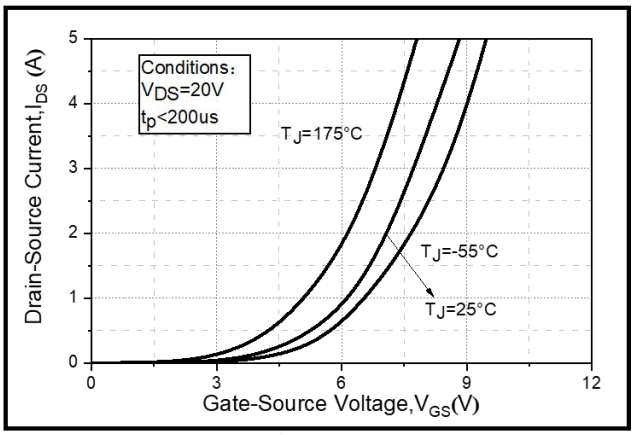


Figure 7. Transfer Characteristic for Various Junction Temperatures

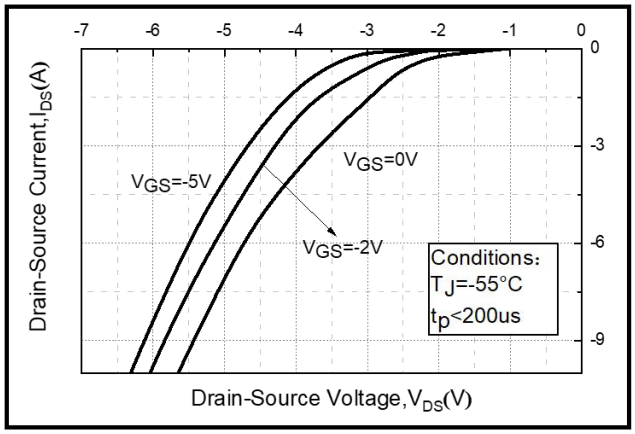


Figure 8. Body Diode Characteristic at -55℃

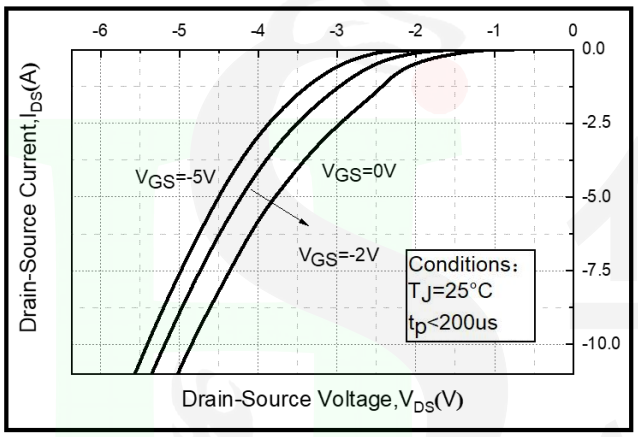


Figure 9. Body Diode Characteristic at 25℃

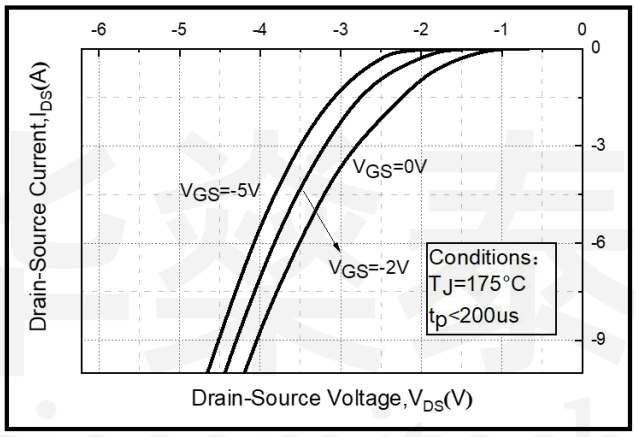


Figure 10. Body Diode Characteristic at 175℃

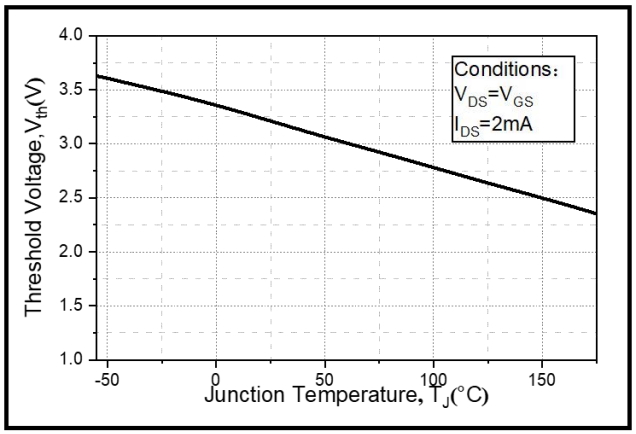


Figure 11. Threshold Voltage vs. Temperature

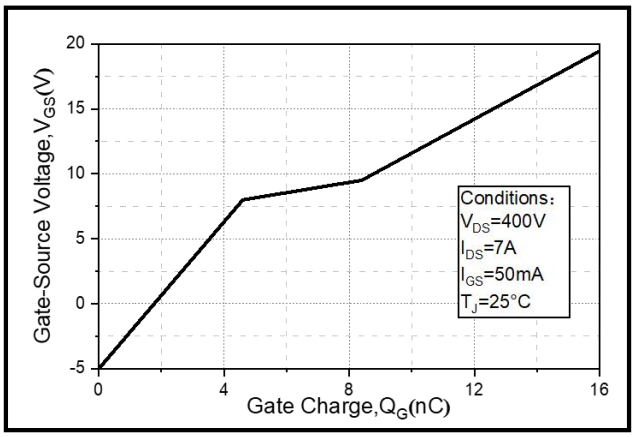


Figure 12. Gate Charge Characteristics

Typical Performance

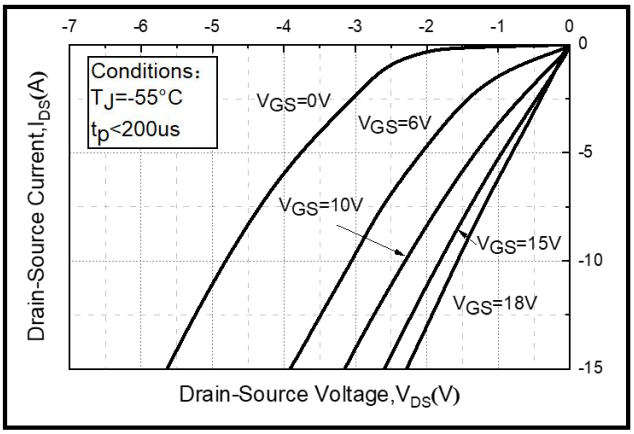


Figure 13. 3rd Quadrant Characteristic at -55℃

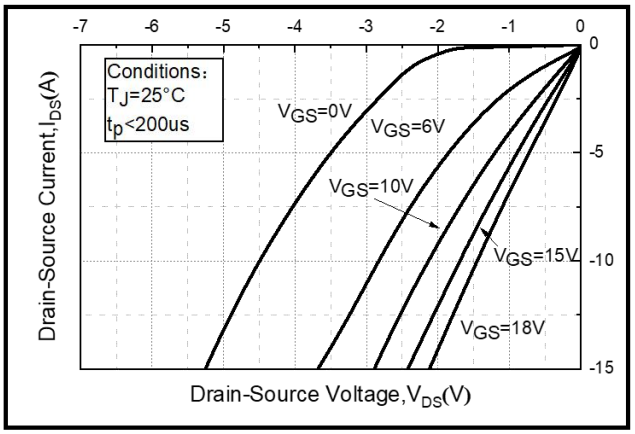


Figure 14. 3rd Quadrant Characteristic at 25℃

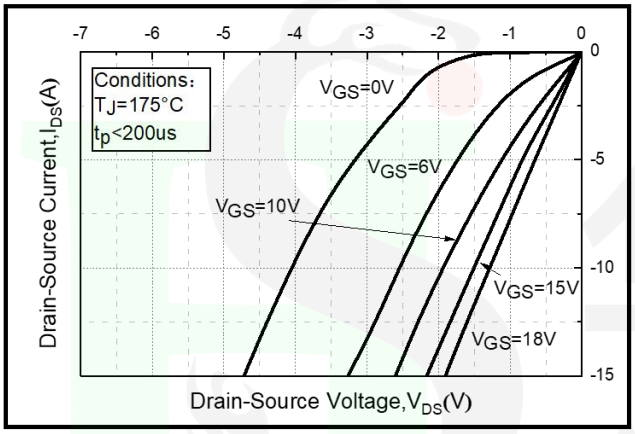


Figure 15. 3rd Quadrant Characteristic at 175℃

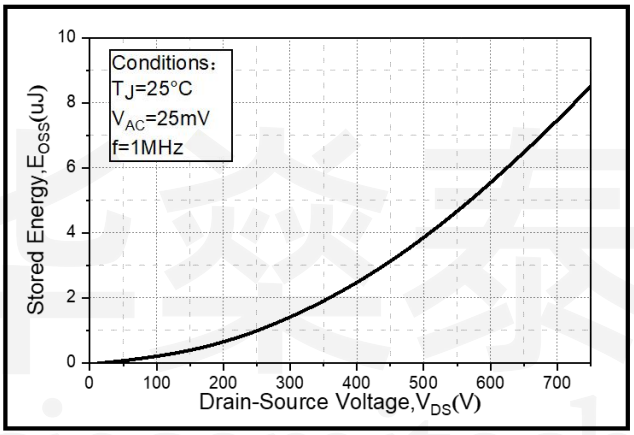


Figure 16. Output Capacitor Stored Energy

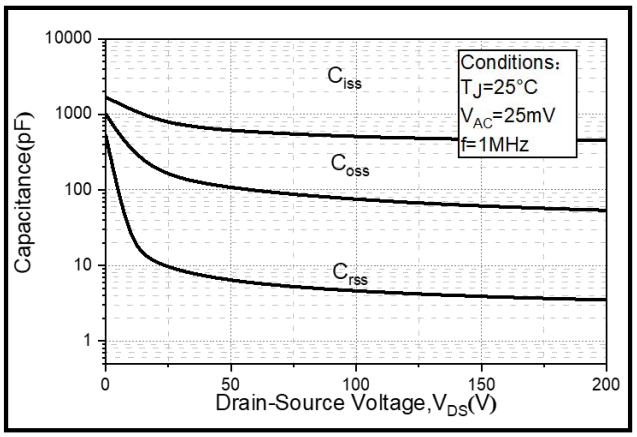


Figure 17. Capacitances vs. Drain-Source Voltage (0 - 200V)

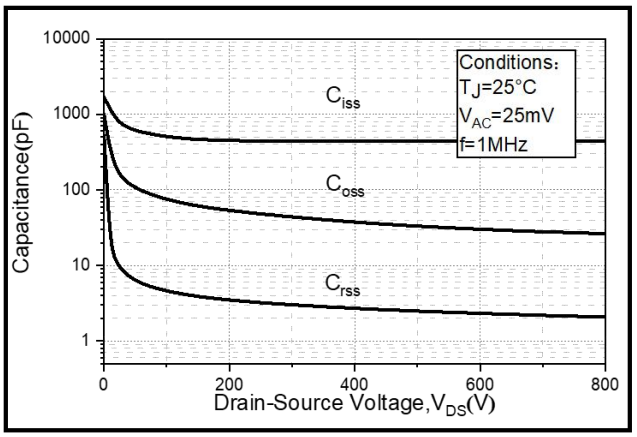


Figure 18. Capacitances vs. Drain-Source Voltage (0 - 800V)

Typical Performance

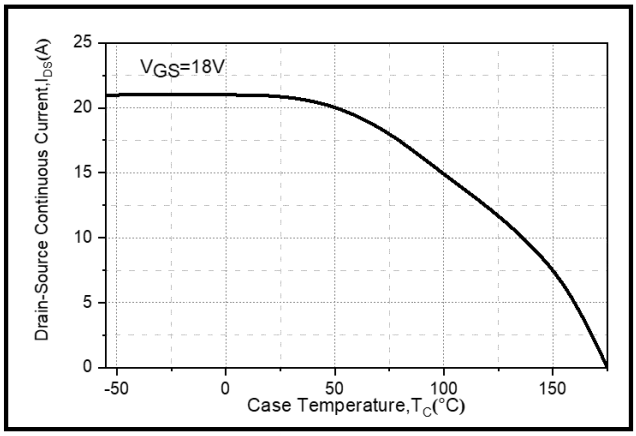


Figure 19. Continuous Drain Current vs. Case Temperature

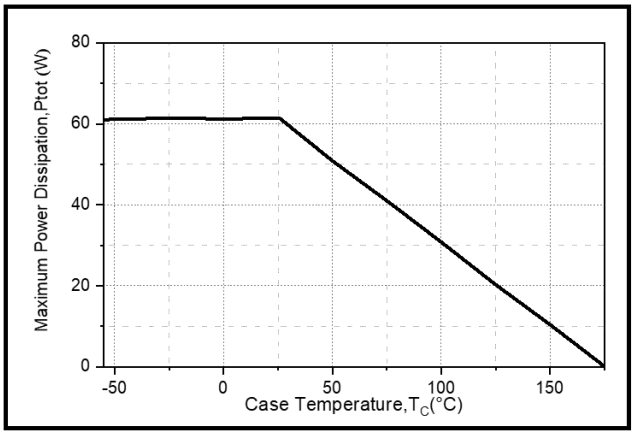


Figure 20. Maximum Power Dissipation vs. Case Temperature

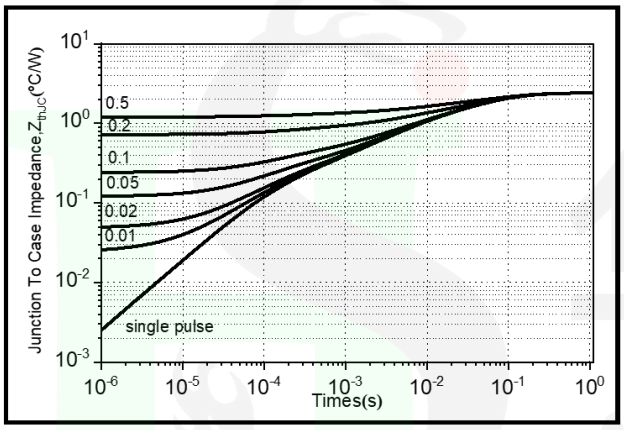


Figure 21. Transient Thermal Impedance(Junction - Case)

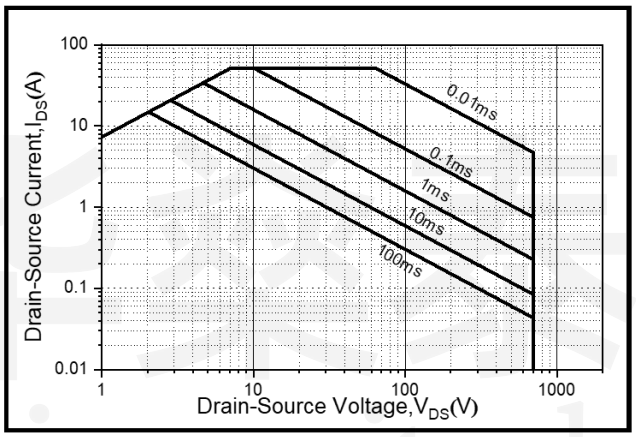


Figure22. Safe Operating Area

Test Circuit Schematic

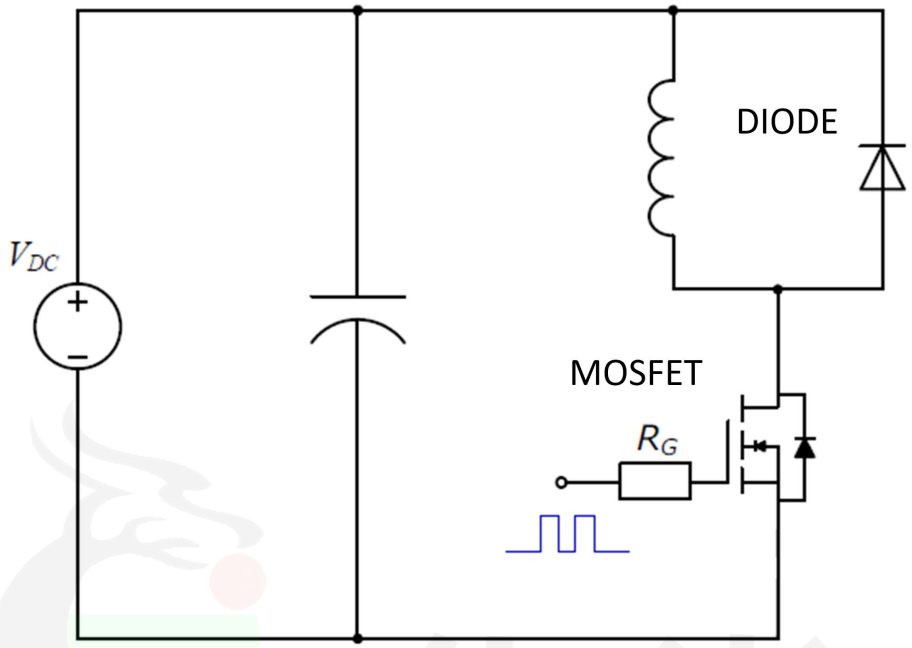
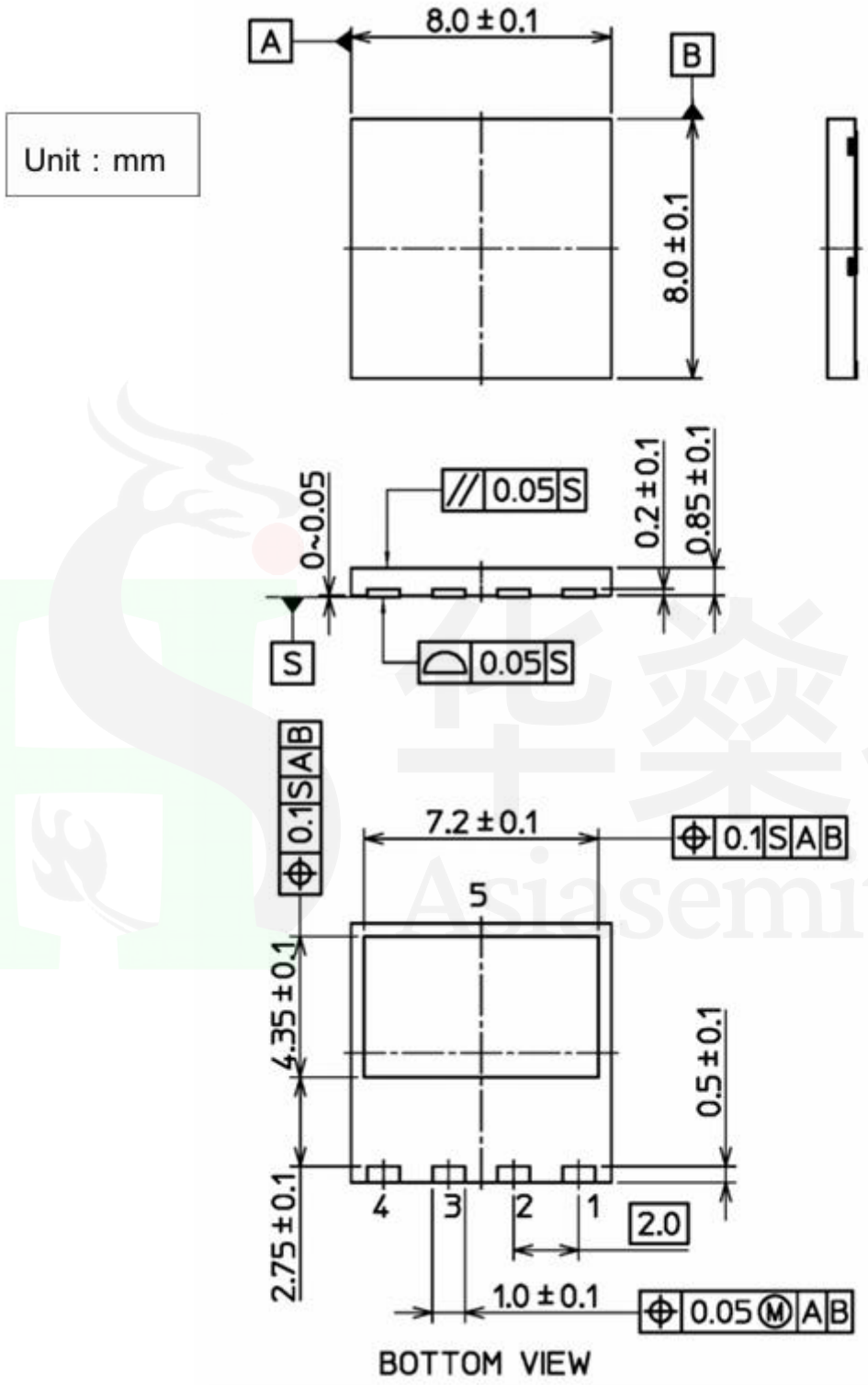


Figure 23. Clamped Inductive Switching Waveform Test Circuit

Package Dimensions



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