MHCHXM®
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HXMC65N160S3

N-Channel SiC Power MOSFET MOSFET

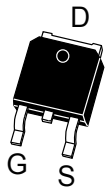
Features

- 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

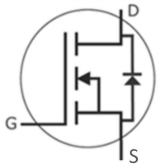
V_{DS}	=	650	V
$R_{DS(on)}$	=	160	mΩ
I_D@25℃	=	20	A

Benefits

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



TO-252-2L



Applications

- Solar and UPS inverters
- On Board Charger
- High voltage DC/DC converters
- Switched mode power supplies
- Load switch
- LED/LCD/PDP TV and monitor Lighting

Pb RoHS Reach

Maximum Ratings (T_C=25℃ unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{DSmax}	Drain-Source Voltage	650	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	20	A	V_{GS}=15V, T_c=25℃	Fig. 19
		14		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	50	A	Pulse width t_p limited by T_{Jmax}	
P_D	Power Dissipation	95	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	650	/	/	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}=650V, V_{GS}=0V	
I_{GSS+}	Gate-Source Leakage Current	/	10	50	nA	V_{DS}=0V, V_{GS}=23V	
I_{GSS-}	Gate-Source Leakage Current	/	10	50	nA	V_{DS}=0V, V_{GS}=-10V	
$R_{DS(on)}$	Drain-Source On-State Resistance	/	160	220	mΩ	V_{GS}=15V, I_D=7A	Fig. 4,5,6
		/	210	/	mΩ	V_{GS}=15V, I_D=7A, T_J=175℃	
		/	130	180	mΩ	V_{GS}=18V, I_D=7A	
		/	173	/	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	/	448	/	pF	V_{GS}=0V V_{DS}=400V f=1MHz	Fig. 17,18
C_{oss}	Output Capacitance	/	44	/			
C_{rss}	Reverse Transfer Capacitance	/	2.2	/			
E_{oss}	C_{oss} Stored Energy	/	2.8	/	μJ	V_{AC}=25mV	Fig. 16
E_{ON}	Turn-On Switching Energy	/	24	/	μJ	V_{DS}=400V, V_{GS}=0V/15V	
E_{OFF}	Turn-Off Switching Energy	/	16	/		I_D=7A, $R_{G(ext)}$=2.5Ω, L=100μH	
$t_{d(on)}$	Turn-On Delay Time	/	11	/	ns	V_{DS}=400V, V_{GS}=0V/15V, I_D=7A $R_{G(ext)}$=2.5Ω, R_L=80Ω	
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	/	7	/	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	/	16	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	1.58	/	℃/W		
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	/	40			

Typical Performance

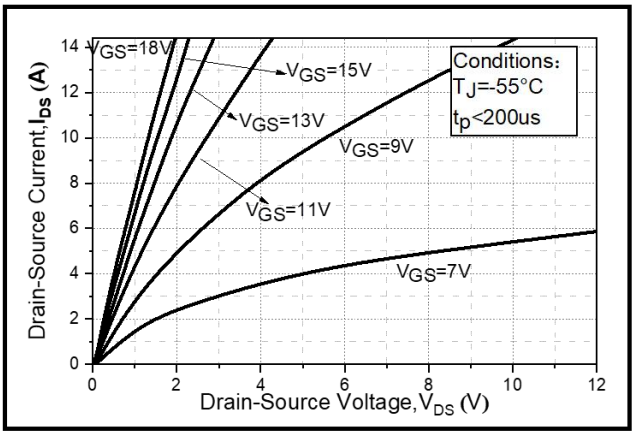


Figure 1. Output Characteristics T_J = -55°C

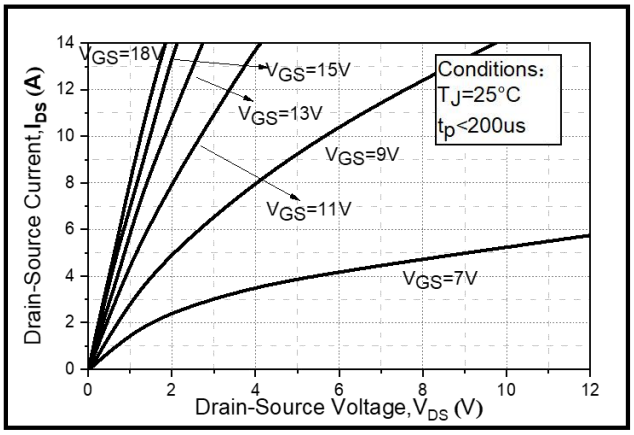


Figure 2. Output Characteristics T_J = 25°C

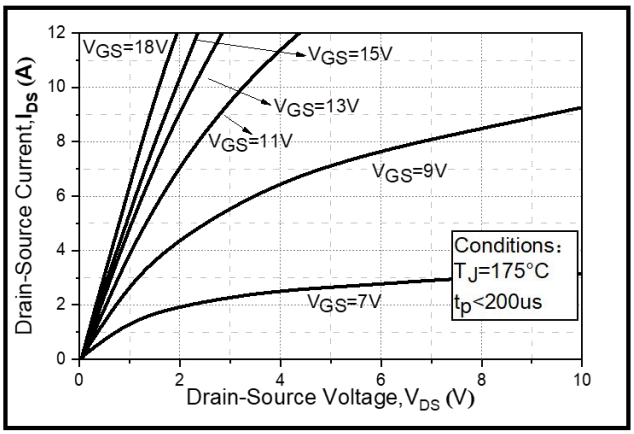


Figure 3. Output Characteristics T_J = 175°C

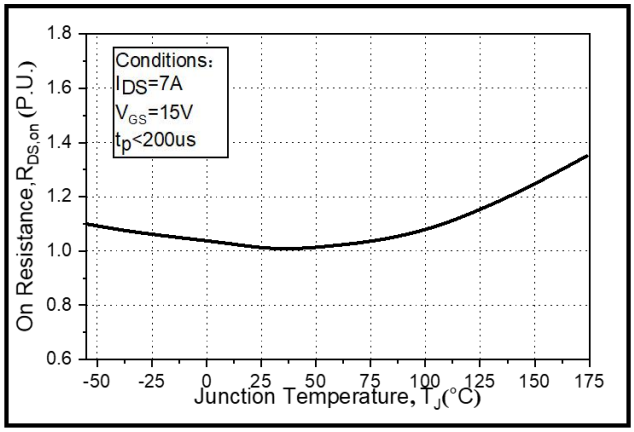


Figure 4. Normalized On-Resistance vs. Temperature

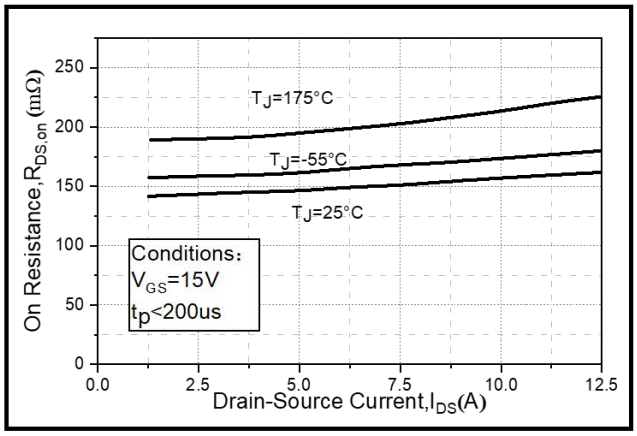


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

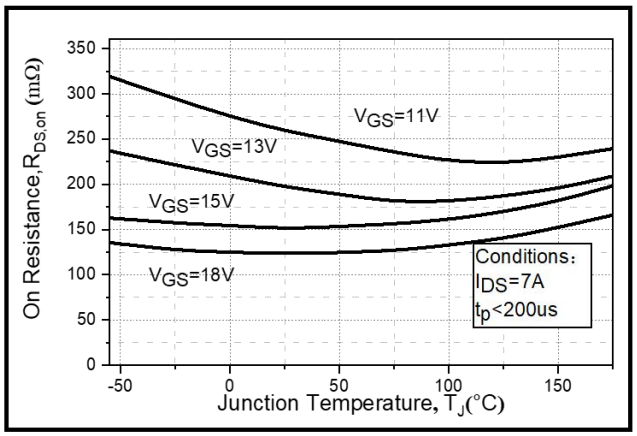


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

Typical Performance

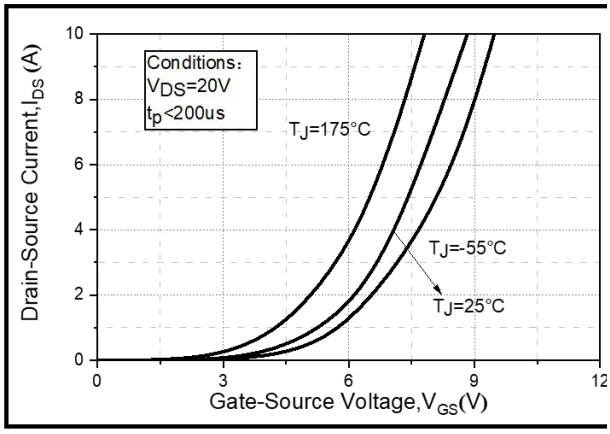


Figure 7. Transfer Characteristic for Various Junction Temperatures

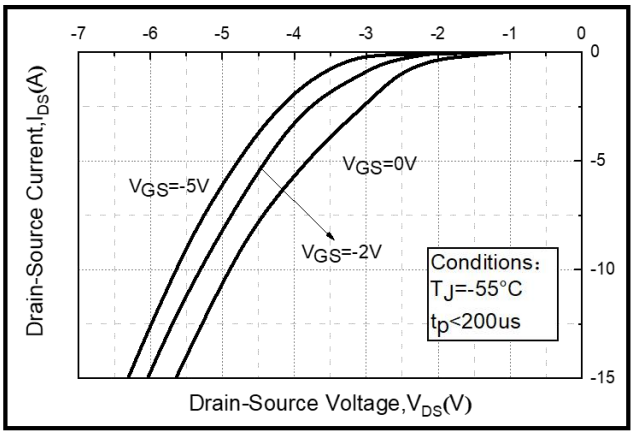


Figure 8. Body Diode Characteristic at -55℃

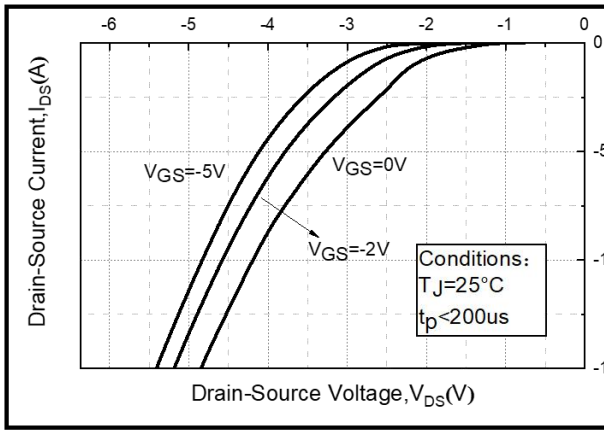


Figure 9. Body Diode Characteristic at 25℃

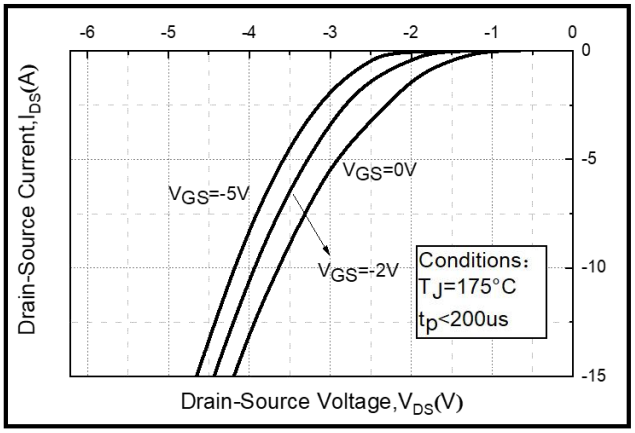


Figure 10. Body Diode Characteristic at 175℃

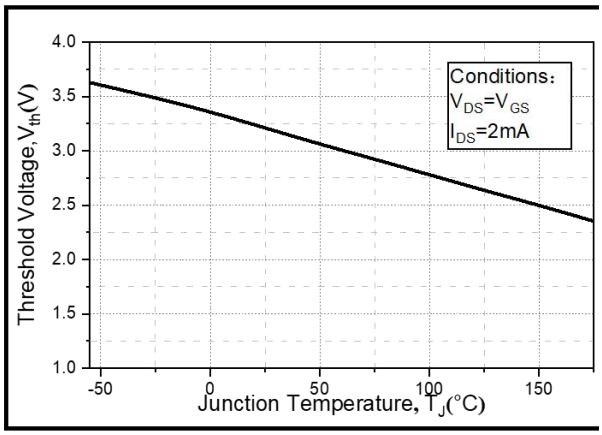


Figure 11. Threshold Voltage vs. Temperature

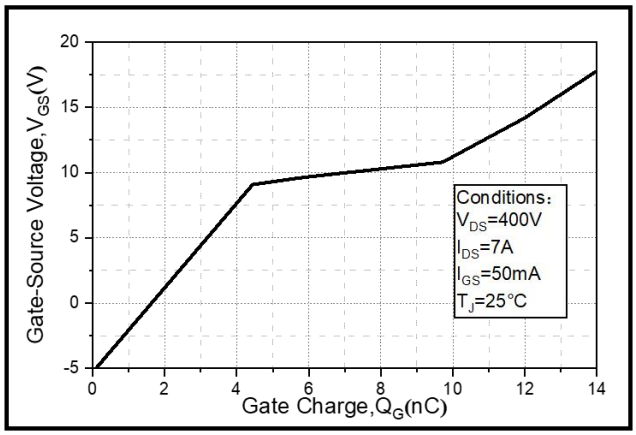


Figure 12. Gate Charge Characteristics

Typical Performance

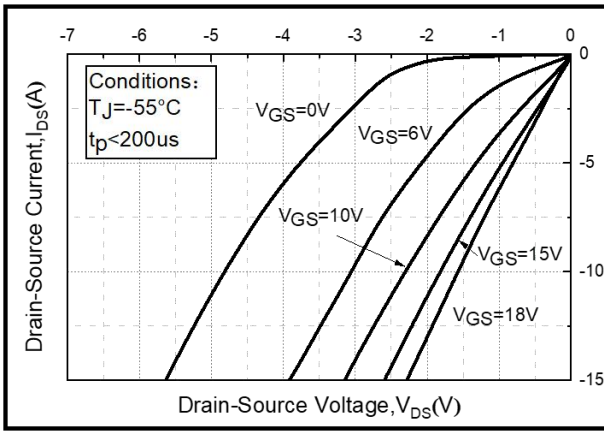


Figure 13. 3rd Quadrant Characteristic at-55˚C

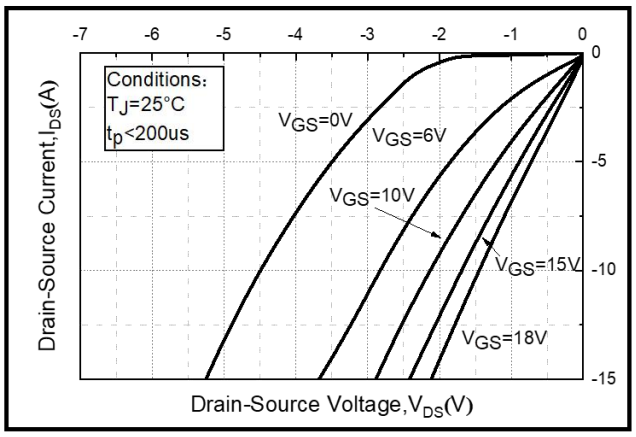


Figure 14. 3rd Quadrant Characteristic at 25˚C

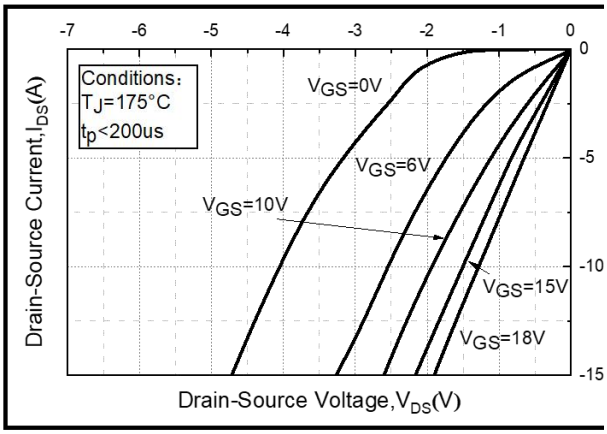


Figure 15. 3rd Quadrant Characteristic at 175˚C

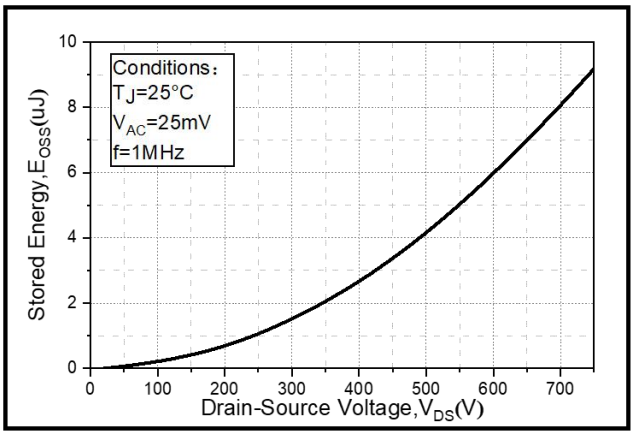


Figure 16. Output Capacitor Stored Energy

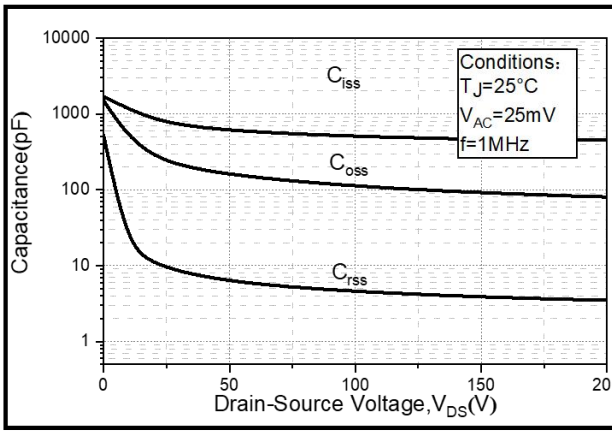


Figure 17. Capacitances vs. Drain-Source Voltage (0 - 200V)

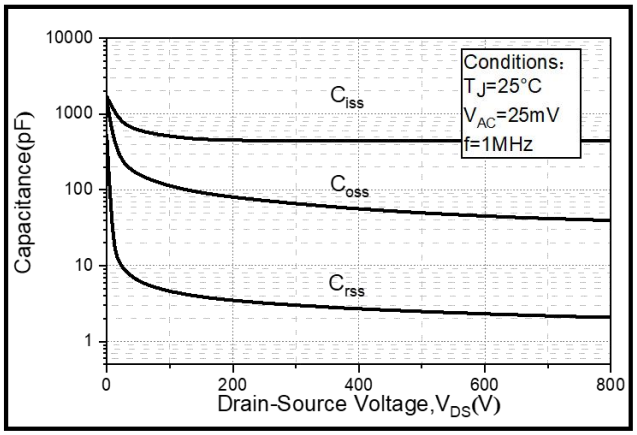


Figure 18. Capacitances vs. Drain-Source Voltage (0 - 800V)

Typical Performance

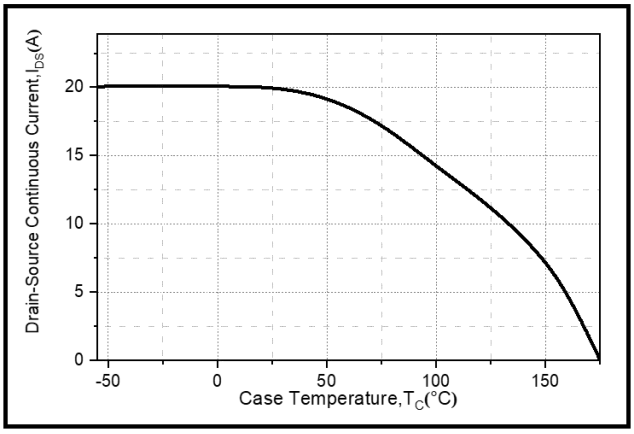


Figure 19. Continuous Drain Current vs. Case Temperature

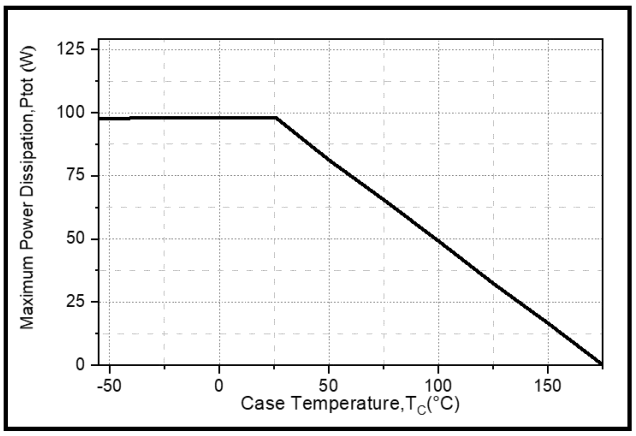


Figure 20. Maximum Power Dissipation vs. Case Temperature

Test Circuit Schematic

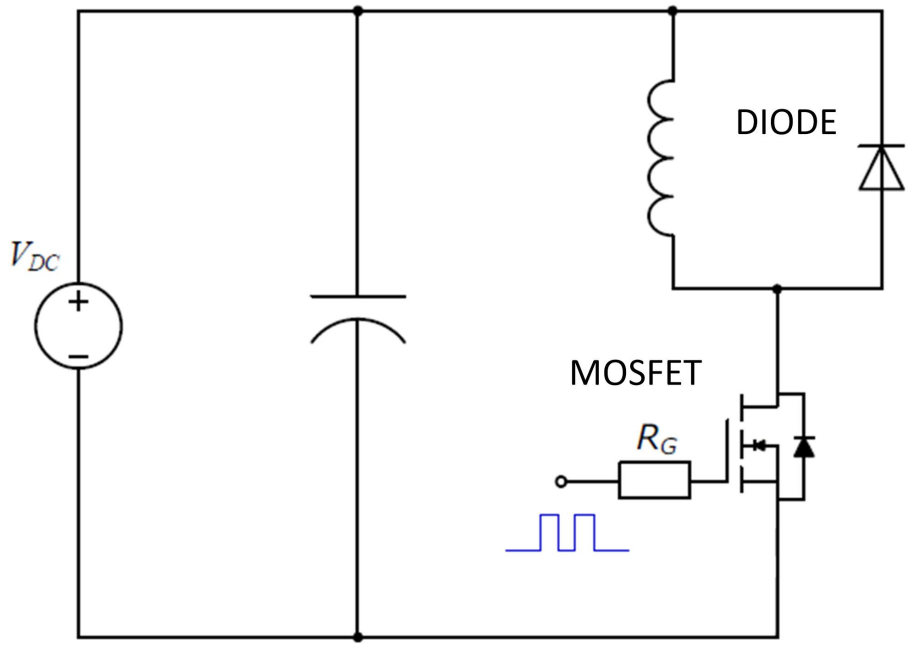
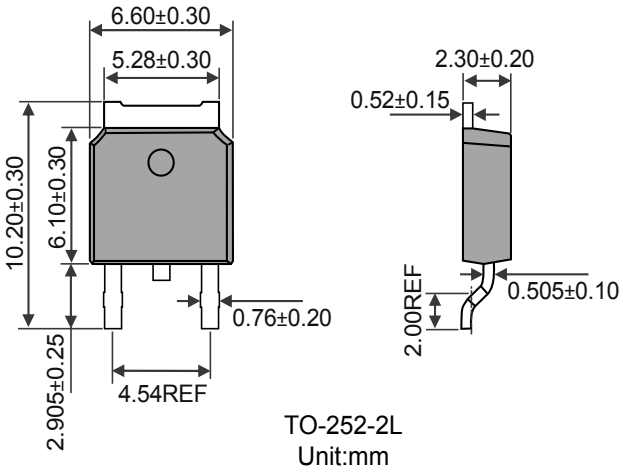


Figure 21. Clamped Inductive Switching Waveform Test Circuit

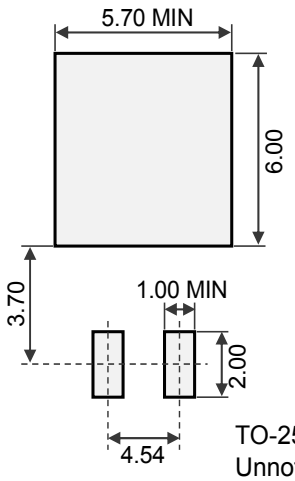
Package Outline Dimensions & Suggested Solder Pad Layout

Package Outline Dimensions



TO-252-2L
Unit:mm

Suggested Solder Pad Layout



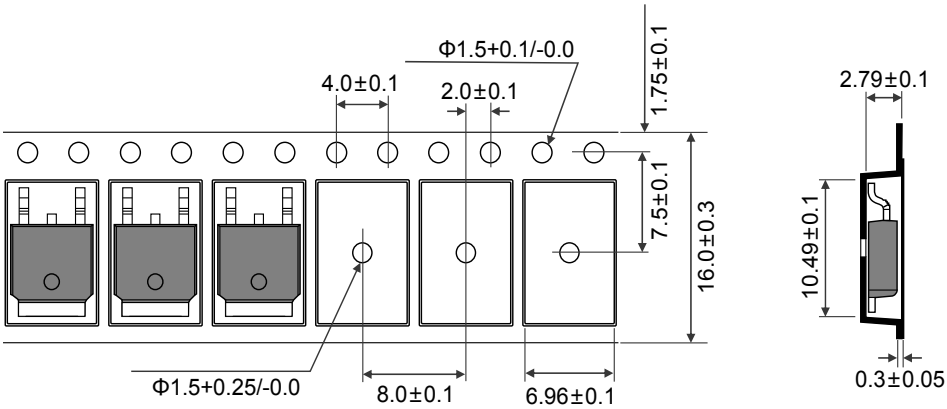
TO-252-2L
Unnoted Tolerance:±0.05
Unit:mm

Marking Information

"MHCHXM"= Product Logo
"Marking Code"= The Following
"XXXX"= Date Code Marking

Marking Code	Part Number
C65N160S3	HXMC65N160S3

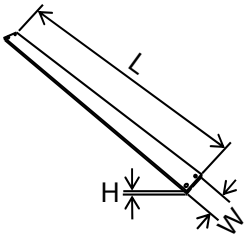
Reel Tape Dimensions (Dimensions in mm)



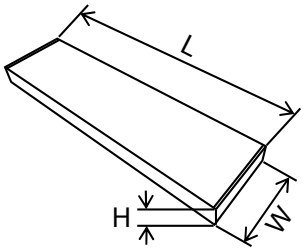
Packing Information

Packaging	Part Number	Quantity(pcs)	Size(mm)
Tube	Tube	80	L540×W20×H5
	Inner Box	4000	L570×W115×H55
	Outer Box	20000	L595×W320×H135
Reel	Reel	3000	Φ330×THK17
	Inner Box	3000	L350×W340×H25
	Outer Box	30000	L355×W300×H360

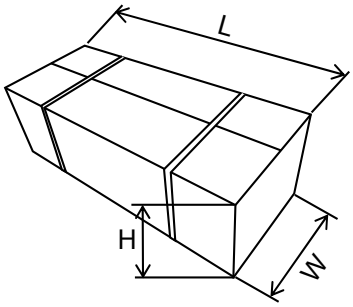
Packaging:Tube



Tube

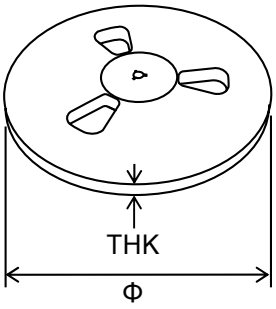


Tube Inner Box

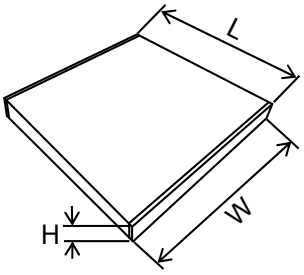


Tube Outer Box

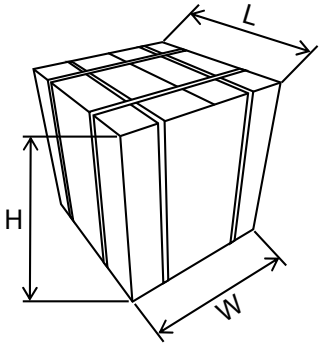
Packaging:Reel



Reel



Reel Inner Box



Reel Outer Box

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2.The graphs shown in this datasheet are representing typical data only and do not show guaranteed values.

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