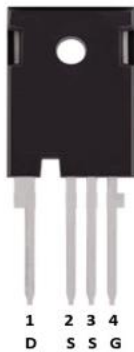


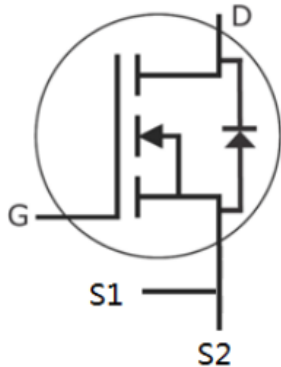
N-channel 1200V, 75mΩ typ.,
Coolin SiC MOS M2

1. Descriptions

TO-247-4



N-Channel MOSFET



Key Performance Parameters

Parameters	Value	Unit
BV_{DSS}	1200	V
$R_{DS(on), Typ.}$	75	mΩ
$I_{DS@25\text{ }^{\circ}\text{C}}$	33	A

Features

- High Blocking Voltage with Low $R_{DS(on)}$
- Fast Switching Speed with Low Capacitance
- Robust Design with Better Avalanche Performance
- Simple to Drive

Applications

- Solar Inverters
- Switch Mode Power Supplies
- EV Motor Drive
- High Voltage DC/DC Converters
- Load Switch

Type/Ordering Code	Package	Marking	Related Links
CMZ120R075M2	TO-247-4	CMZ120R075M2	See Appendix A

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2. Maximum Ratings

At $T_J = 25^\circ\text{C}$, unless otherwise specified

Table 1. Absolute Maximum Ratings

Parameter	Symbol	Values	Unit
Drain-Source Voltage	V_{DSS}	1200	V
Continuous Drain Current ²⁾	I_D	$T_C=25^\circ\text{C}, V_{GS}=20\text{V}$	A
		$T_C=100^\circ\text{C}, V_{GS}=20\text{V}$	
Pulsed Drain Current	$I_{D,pulse}$	80	A
Gate Source Voltage (Recommended Operational Values)	V_{GS}	-4 to 18	V
Operating and Storage Temperature	T_J, T_{stg}	-55 to 175	$^\circ\text{C}$
Power Dissipation	P_D	136	W

3. Thermal Characteristics

Table 2. Thermal Characteristics TO-247

Symbol	Parameter	Values			Unit	Test Condition
		Min.	Typ.	Max.		
R_{thJC}	Thermal Resistance, Junction - Case	-	0.84	-	$^\circ\text{C/W}$	

4. Electrical Characteristics

At $T_J = 25^\circ\text{C}$, unless otherwise specified

Table 3. Static Characteristics

Symbol	Parameter	Values			Unit	Test Condition
		Min.	Typ.	Max.		
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	1200	-	-	V	$V_{GS}=0\text{V}, I_D=100\mu\text{A}$
$V_{(GS)th}$	Gate Threshold Voltage	1.9	2.6	4.0	V	$V_{DS}=V_{GS}, I_D=5\text{mA}$
		-	1.8	-		$V_{DS}=V_{GS}, I_D=5\text{mA}, T_J=175^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	-	1	100	μA	$V_{DS}=1200\text{V}, V_{GS}=0\text{V}, T_J=25^\circ\text{C}$
I_{GSS}	Gate-Source Leakage Current	-	10	250	nA	$V_{GS}=22\text{V}, V_{DS}=0\text{V}$
$R_{DS(on)}$	Drain-Source On-State Resistance	-	75	95	m Ω	$V_{GS}=18\text{V}, I_D=20\text{A},$
			120	-		$V_{GS}=18\text{V}, I_D=20\text{A}, T_J=175^\circ\text{C}$

Table 4. Dynamic Characteristics

Symbol	Parameter	Values			Unit	Test Condition
		Min.	Typ.	Max.		
C_{iss}	Input Capacitance	-	1200	-	pF	$V_{GS}=0V, V_{DS}=1000V, f=1MHz$
C_{oss}	Output Capacitance	-	63	-	pF	$V_{GS}=0V, V_{DS}=1000V, f=1MHz$
C_{rss}	Reverse Transfer Capacitance	-	9.8	-	pF	$V_{GS}=0V, V_{DS}=1000V, f=1MHz$
$t_{d(on)}$	Turn-On Delay Time	-	13	-	ns	$V_{DS}=800V, V_{GS}= -4V \text{ to } 18V, I_D=20A, R_g=2.5\Omega, R_L=20\Omega$
t_r	Rise Time	-	12	-	ns	
$t_{d(off)}$	Turn-Off Delay Time	-	16	-	ns	
t_f	Fall Time	-	10	-	ns	
E_{on}	Turn-On Switching Energy	-	586	-	μJ	$V_{DS}=800V, V_{GS}=-4V \text{ to } 18V, I_D=20A, R_g=2.5\Omega, L=100\mu H$
E_{off}	Turn-Off Switching Energy	-	273	-		
R_g	Internal Gate Resistance	-	5.5	-	Ω	$f=1MHz, V_{AC}=25mV$

Table 5. Gate Charge Characteristics

Symbol	Parameter	Values			Unit	Test Condition
		Min.	Typ.	Max.		
Q_{gs}	Gate to Source Charge	-	21.5	-	nC	$V_{DS}=800V, V_{GS}=-4V \text{ to } 18V, I_D=20A$
Q_{gd}	Gate to Drain Charge	-	14.6	-	nC	
Q_g	Gate Charge Total	-	68.1	-	nC	

Table 6. Reverse Diode Characteristics

Symbol	Parameter	Values			Unit	Test Condition
		Min.	Typ.	Max.		
V_{SD}	Diode Forward Voltage	-	4.2	-	V	$V_{GS}=-4V, I_{SD}=10A$
			3.8			$V_{GS}=-4V, I_{SD}=10A, T_J=175^\circ C$
t_{rr}	Reverse Recovery Time	-	28	-	ns	$V_R=800V, I_{SD}=20A$
Q_{rr}	Reverse Recovery Charge	-	62	-	nC	
I_{rrm}	Peak Reverse Recovery Current	-	3.7	-	A	

5. Electrical Characteristics Diagrams

Diagram 1: Typical Output Characteristics at -55°C

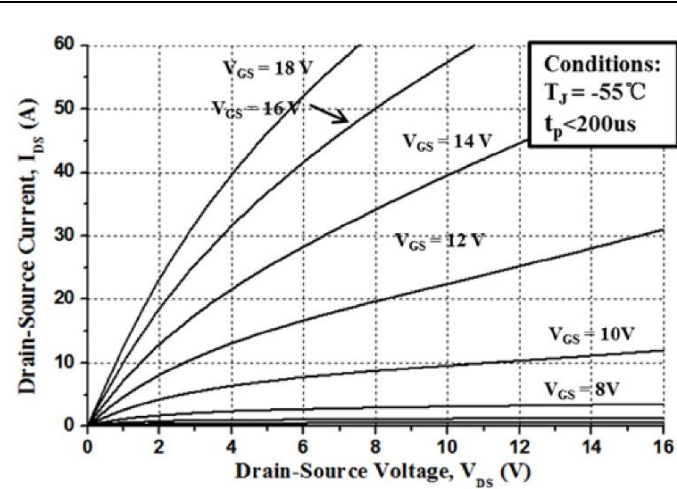


Diagram 2: Typical Output Characteristics at 25°C

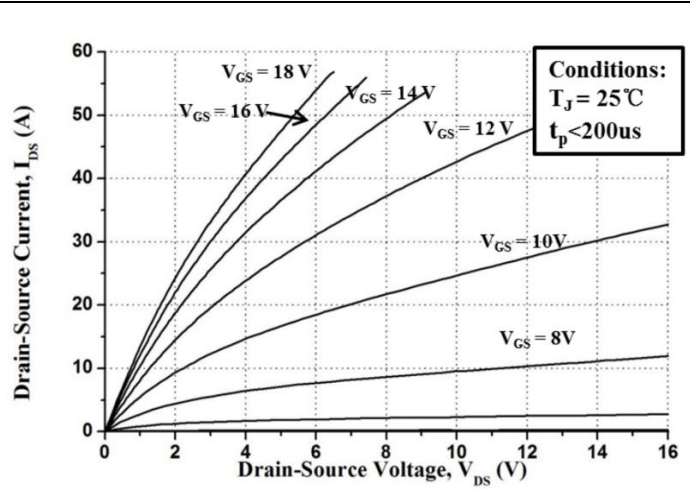


Diagram 3: Typical Output Characteristics at 175°C

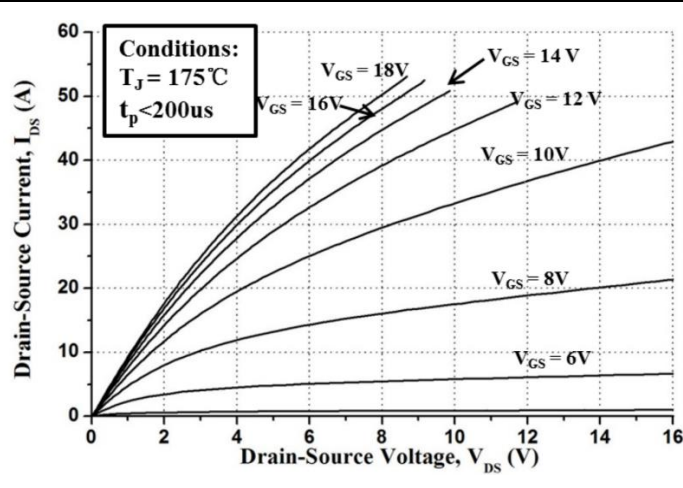


Diagram 4: Normalized On-Resistance vs. Temperature

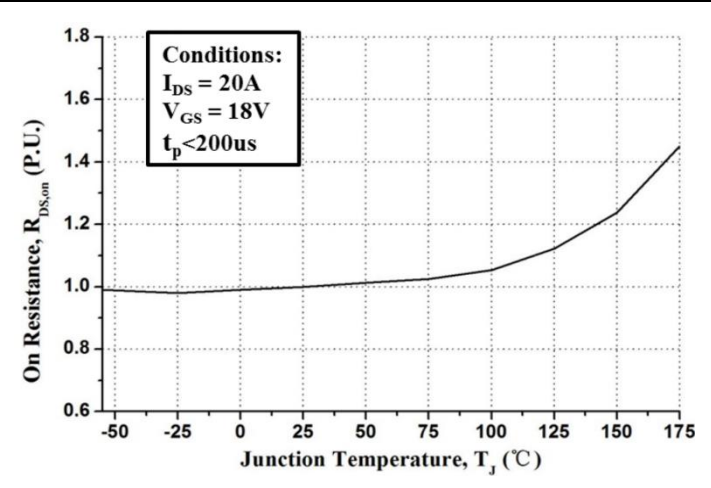


Diagram 5: On-Resistance vs. Drain Current

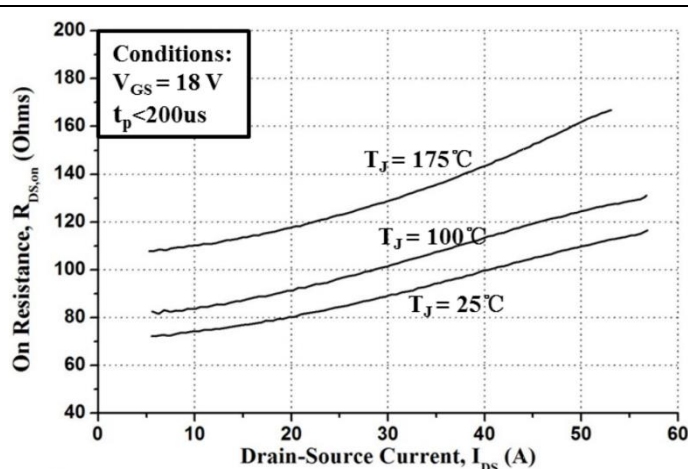


Diagram 6: On-Resistance vs. Temperature

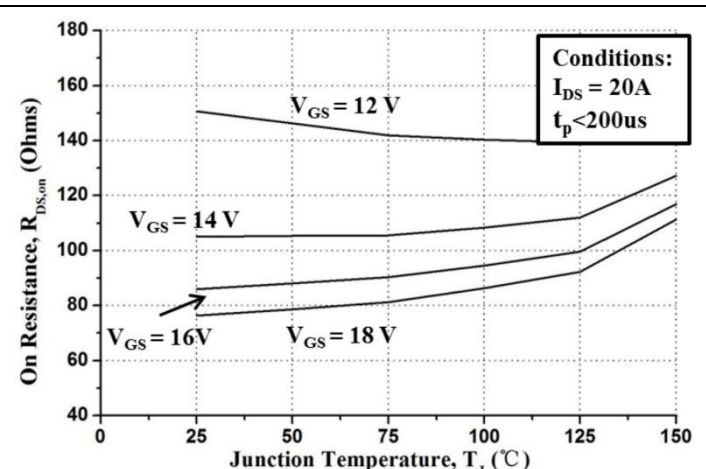


Diagram 7: Typical Transfer Characteristics

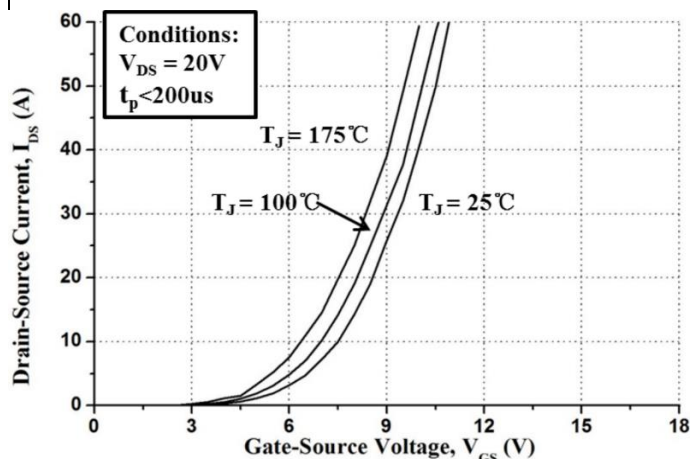


Diagram 8: Body Diode Characteristics at 25°C

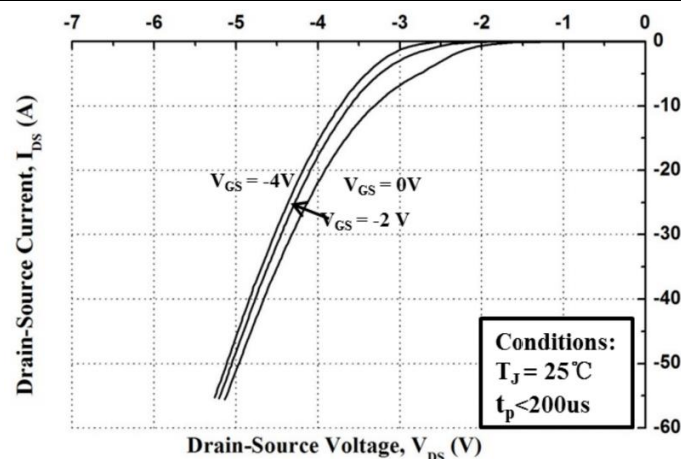


Diagram 9: Body Diode Characteristics at 100°C

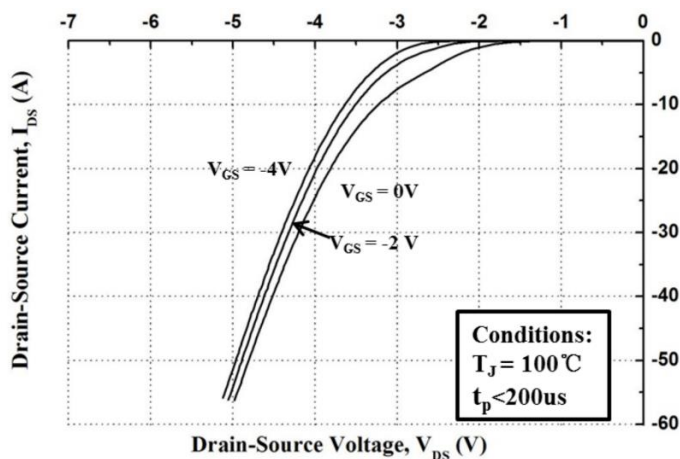


Diagram 10: Body Diode Characteristics at 175°C

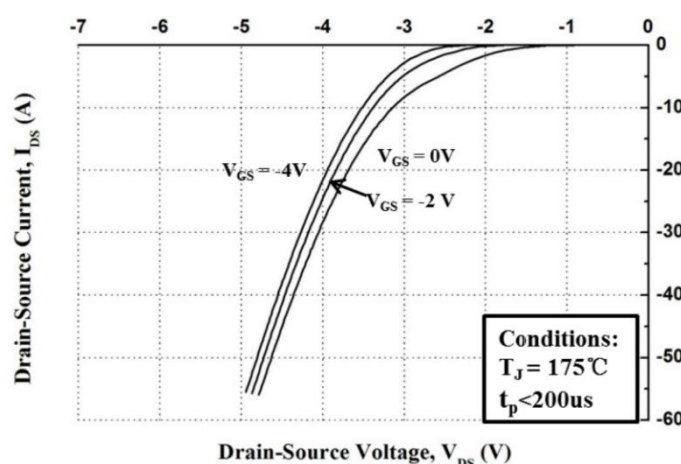


Diagram 11: Gate Threshold Voltage vs. Temperature

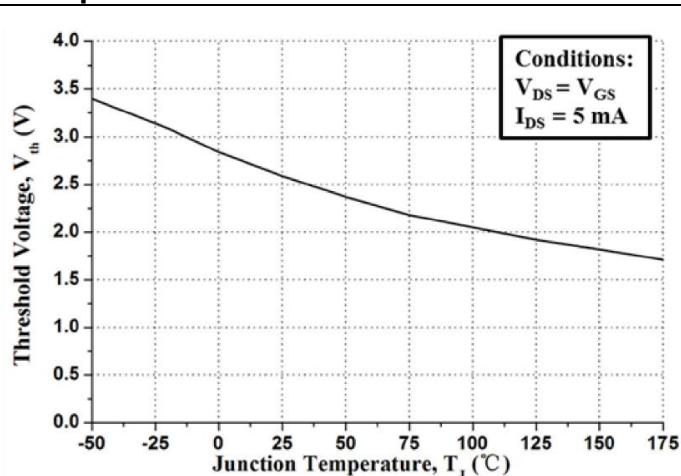


Diagram 12: Gate Charge Characteristics

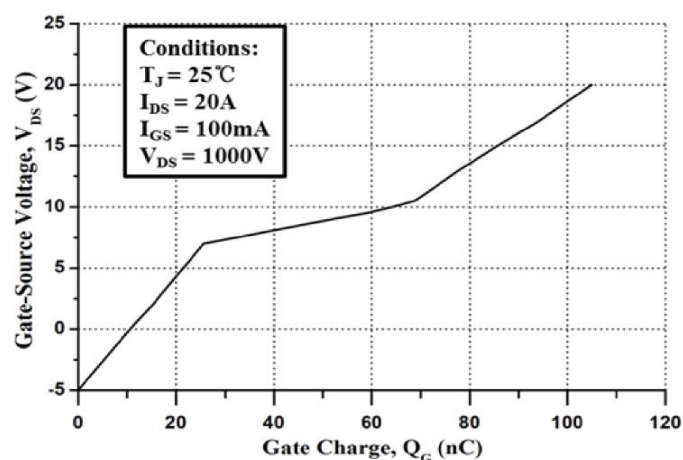


Diagram 13: 3rd Quadrant Characteristics at 25°C

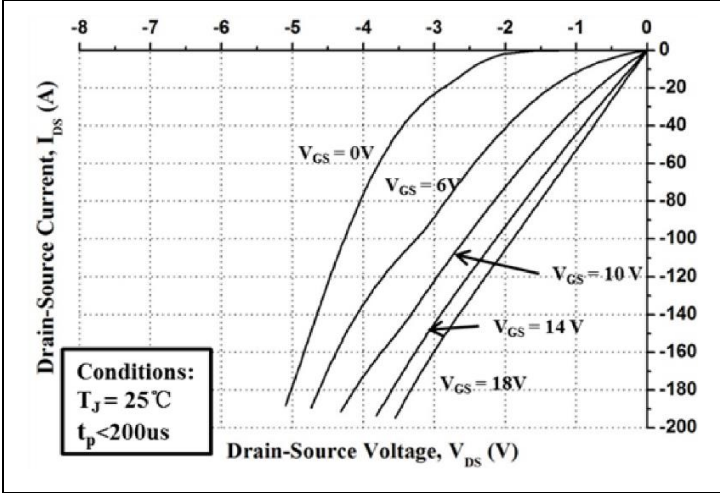
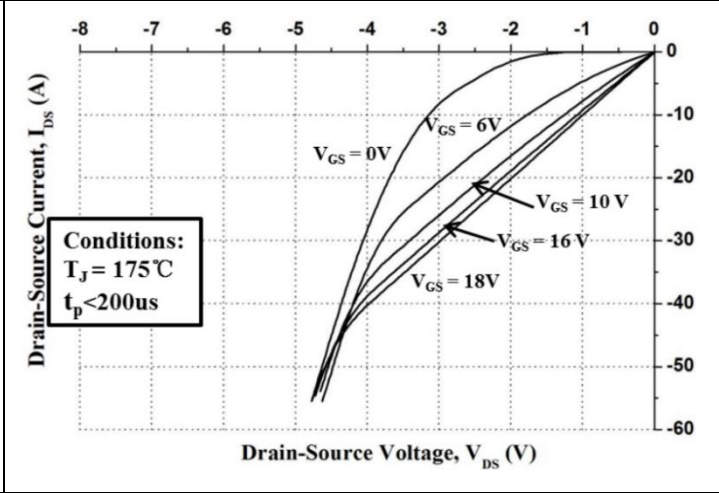


Diagram 14: 3rd Quadrant Characteristics at 175°C



6. Test Circuits

Table 7. Diode Characteristics

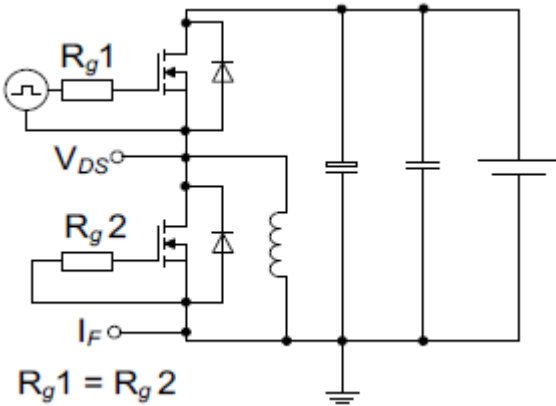
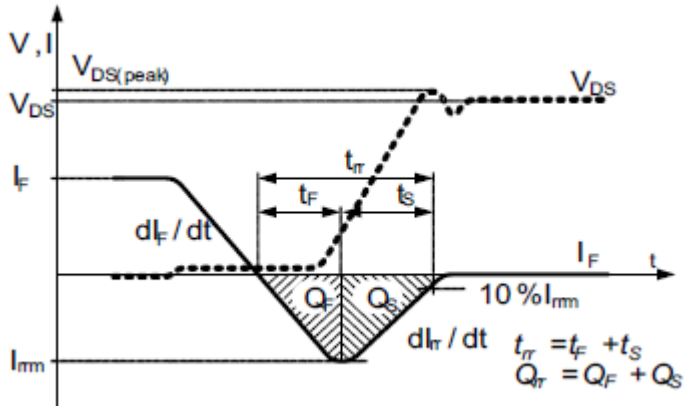
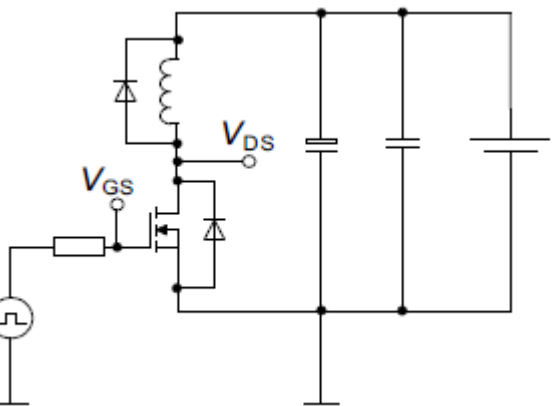
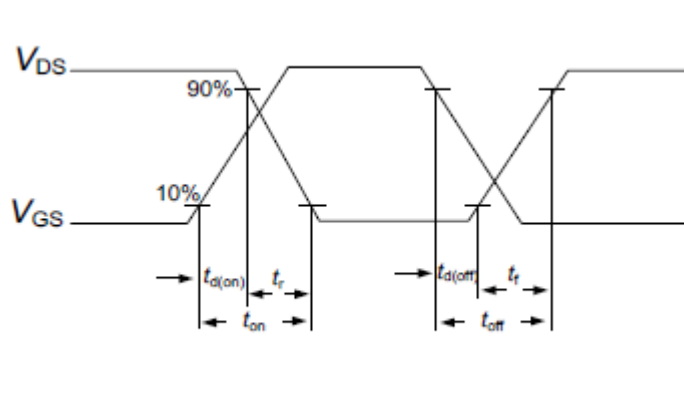
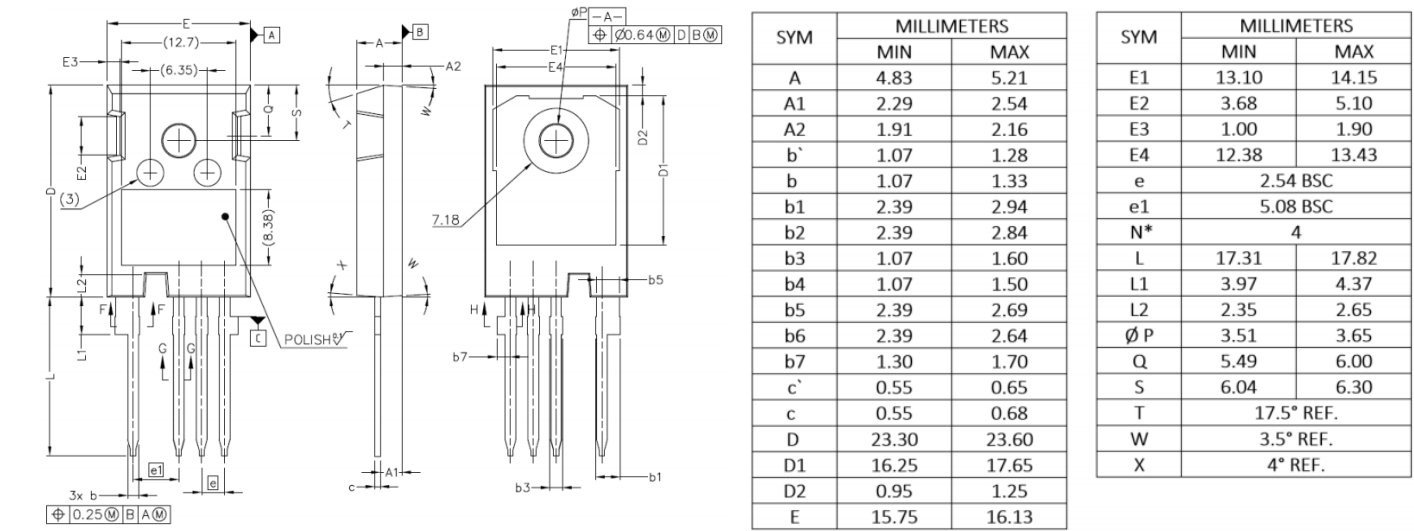
Test Circuit for Diode Characteristics	Diode Recovery Waveform
 $R_{g1} = R_{g2}$	 $t_{rr} = t_F + t_S$ $Q_{rr} = Q_F + Q_S$

Table 8. Switching Times

Switching Times Test Circuit for Inductive Load	Switching Times Waveform
	

7. Package Outlines

Figure 1 Outline TO-247-4 Dimensions in mm



8. Appendix

CoolSemi CoolinSiC Webpage: www.coolsemi.com.