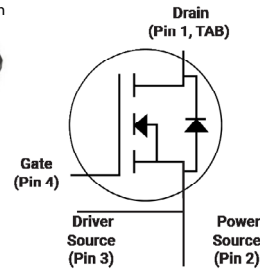
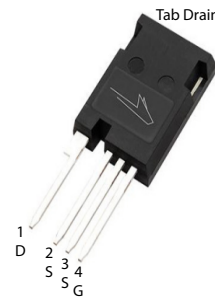


C3M0030170P

Silicon Carbide Power MOSFET C3M™ MOSFET Technology N-Channel Enhancement Mode

Features

- 3rd generation SiC MOSFET technology
- Optimized package with separate driver source pin
- 8mm of creepage distance between drain and source
- High blocking voltage with low on-resistance
- High-speed switching with low capacitances
- Fast intrinsic diode with low reverse recovery (Q_{rr})
- Halogen free, RoHS compliant



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Part Number	Package	Marking
C3M0030170P	TO-247-4 Plus	C3M0030170P

Typical Applications

- Solar inverters
- EV motor drive
- High voltage DC/DC converters
- Switched mode power supplies
- Load switch

Benefits

- Reduce switching losses and minimize gate ringing
- Higher system efficiency
- Reduce cooling requirements
- Increase power density
- Increase system switching frequency

Key Parameters

Parameter	Symbol	Min.	Typ.	Max	Unit	Conditions	Note
Drain - Source Voltage	V_{DS}			1700	V	$T_c = 25^\circ\text{C}$	
Maximum Gate - Source Voltage	$V_{GS(max)}$	-8		+19		Transient	
Operational Gate-Source Voltage	$V_{GS op}$		-4/15			Static	Note 1
DC Continuous Drain Current	I_D			74	A	$V_{GS} = 15\text{ V}, T_c = 25^\circ\text{C}, T_J \leq 175^\circ\text{C}$	Fig. 19 Note 2
				48		$V_{GS} = 15\text{ V}, T_c = 100^\circ\text{C}, T_J \leq 175^\circ\text{C}$	
Pulsed Drain Current	I_{DM}			483		t_{pmax} limited by T_{Jmax} $V_{GS} = 15\text{ V}, T_c = 25^\circ\text{C}$	Fig. 22
Power Dissipation	P_D			427	W	$T_c = 25^\circ\text{C}, T_J = 175^\circ\text{C}$	Fig. 20
Operating Junction and Storage Temperature	T_J, T_{stg}	-40		+175	$^\circ\text{C}$		
Solder Temperature	T_L			260		According to JEDEC J-STD-020	
Mounting Torque	M_D			1 8.8	Nm lbf-in	M3 or 6-32 screw	

Note (1): Recommended turn-on gate voltage is 15V with $\pm 5\%$ regulation tolerance, see Application Note PRD-04814 for additional details

Note (2): Verified by design

Electrical Characteristics ($T_c = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions	Note
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	1700	—	—	V	$V_{GS} = 0\text{ V}, I_D = 100\text{ }\mu\text{A}$	
Gate Threshold Voltage	$V_{GS(th)}$	1.8	2.6	3.6		$V_{DS} = V_{GS}, I_D = 19\text{ mA}, T_J = 25^\circ\text{C}$	Fig. 11
Gate Threshold Voltage		—	2.2	—		$V_{DS} = V_{GS}, I_D = 19\text{ mA}, T_J = 175^\circ\text{C}$	Fig. 11
Zero Gate Voltage Drain Current	I_{DSS}	—	1	50	μA	$V_{DS} = 1700\text{ V}, V_{GS} = 0\text{ V}$	
Gate-Source Leakage Current	I_{GSS}	—	10	250	nA	$V_{GS} = 15\text{ V}, V_{DS} = 0\text{ V}$	
Drain-Source On-State Resistance	$R_{DS(on)}$	—	30	40.5	m Ω	$V_{GS} = 15\text{ V}, I_D = 69\text{ A}$	Fig. 4, 5, 6
		—	77	—		$V_{GS} = 15\text{ V}, I_D = 69\text{ A}, T_J = 175^\circ\text{C}$	
Transconductance	g_{fs}	—	53	—	S	$V_{DS} = 20\text{ V}, I_{DS} = 69\text{ A}$	Fig. 7
			48			$V_{DS} = 20\text{ V}, I_{DS} = 69\text{ A}, T_J = 175^\circ\text{C}$	
Input Capacitance	C_{iss}	—	6284	—	pF	$V_{GS} = 0\text{ V}, V_{DS} = 1200\text{ V}$ $f = 100\text{ kHz}$ $V_{AC} = 25\text{ mV}$	Fig. 17, 18
Output Capacitance	C_{oss}	—	110	—			
Reverse Transfer Capacitance	C_{rss}	—	10	—			
C_{oss} Stored Energy	E_{oss}	—	94	—	μJ		Fig. 16
Turn-On Switching Energy (SiC Diode FWD)	E_{on}	—	2729	—	μJ	$V_{DS} = 1200\text{ V}, V_{GS} = -4\text{ V}/15\text{ V},$ $I_D = 69\text{ A}, R_{G(ext)} = 2.5\text{ }\Omega,$ $L = 99\text{ }\mu\text{H}, T_J = 175^\circ\text{C}$	Fig. 26
Turn Off Switching Energy (SiC Diode FWD)	E_{off}	—	1048	—			
Turn-On Switching Energy (Body Diode FWD)	E_{on}	—	3090	—			
Turn-Off Switching Energy (Body Diode FWD)	E_{off}	—	1082	—			
Turn-On Delay Time	$t_{d(on)}$	—	47	—	ns	$V_{DD} = 1200\text{ V}, V_{GS} = -4\text{ V}/15\text{ V}$ $I_D = 69\text{ A}, R_{G(ext)} = 2.5\text{ }\Omega,$ $L = 99\text{ }\mu\text{H}$ Timing relative to V_{DS} Inductive load	Fig. 27
Rise Time	t_r	—	38	—			
Turn-Off Delay Time	$t_{d(off)}$	—	96	—			
Fall Time	t_f	—	20	—			
Internal Gate Resistance	$R_{G(int)}$	—	5.4	—	Ω	$f = 1\text{ MHz}$	
Effective Output Capacitance (Energy Related)	$C_{O(er)}$	—	142	—	pF	$V_{GS} = 0\text{ V}, V_{DS} = 0\text{...}1200\text{ V}$	Note 3
Effective Output Capacitance (Time Related)	$C_{O(tr)}$	—	224	—			
Gate to Source Charge	Q_{gs}	—	59	—	nC	$V_{DS} = 1200\text{ V}, V_{GS} = -4\text{ V}/15\text{ V}$ $I_D = 69\text{ A}$ Per IEC60747-8-4 pg 21	Fig. 12
Gate to Drain Charge	Q_{gd}	—	57	—			
Total Gate Charge	Q_g	—	219	—			

Note:

³ $C_{O(er)}$ a lumped capacitance that gives the same stored energy as C_{oss} while V_{ds} is rising from 0 to 1200V

$C_{O(tr)}$ a lumped capacitance that gives the same charging time as C_{oss} while V_{ds} is rising from 0 to 1200V



Reverse Diode Characteristics ($T_c = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Typ.	Max.	Unit	Test Conditions	Notes
Diode Forward Voltage	V_{SD}	5.5	—	V	$V_{GS} = -4\text{ V}, I_{SD} = 34.5\text{ A}, T_J = 25^\circ\text{C}$	Fig. 8, 9, 10
		4.9	—		$V_{GS} = -4\text{ V}, I_{SD} = 34.5\text{ A}, T_J = 175^\circ\text{C}$	
Continuous Diode Forward Current	I_S	—	69	A	$V_{GS} = -4\text{ V}, T_J = 25^\circ\text{C}$	
Diode Pulse Current	I_{SM}	—	483		$V_{GS} = -4\text{ V}$, pulse width t_p limited by $T_{J\text{max}}$	
Reverse Recovery Time	t_{rr}	115	—	ns	$V_{GS} = -4\text{ V}, I_{SD} = 69\text{ A}, V_R = 1200\text{ V}$ $T_J = 175^\circ\text{C}, di_F/dt = 2093\text{ A}/\mu\text{s}$	
Reverse Recovery Charge	Q_{rr}	1971	—	nC		
Peak Reverse Recovery Current	I_{RRM}	26	—	A		
Reverse Recovery Time	t_{rr}	53	—	ns	$V_{GS} = -4\text{ V}, I_{SD} = 69\text{ A}, V_R = 1200\text{ V}$ $T_J = 175^\circ\text{C}, di_F/dt = 3286\text{ A}/\mu\text{s}$	
Reverse Recovery Charge	Q_{rr}	1194	—	nC		
Peak Reverse Recovery Current	I_{RRM}	39	—	A		

Thermal Characteristics

Parameter	Symbol	Typ	Max	Unit	Note
Thermal Resistance from Junction to Case	$R_{\theta JC}$	0.27	0.35	$^\circ\text{C}/\text{W}$	Fig. 21
Thermal Resistance From Junction to Ambient	$R_{\theta JA}$	40	-		

Typical Performance

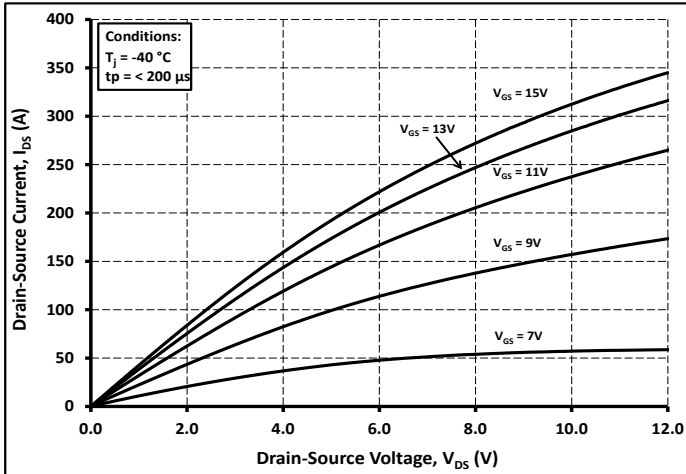
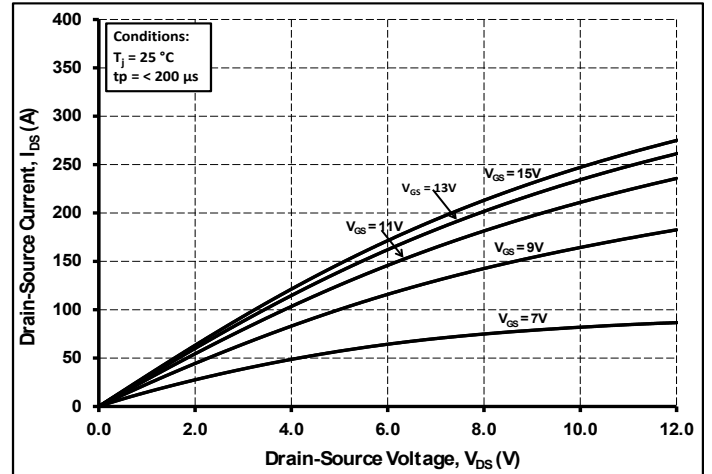
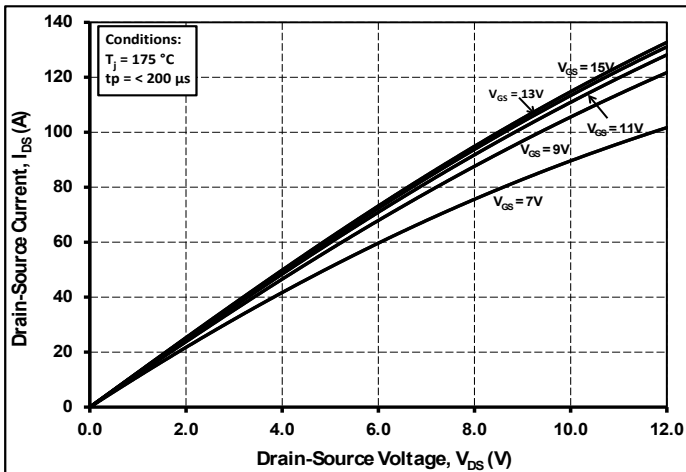
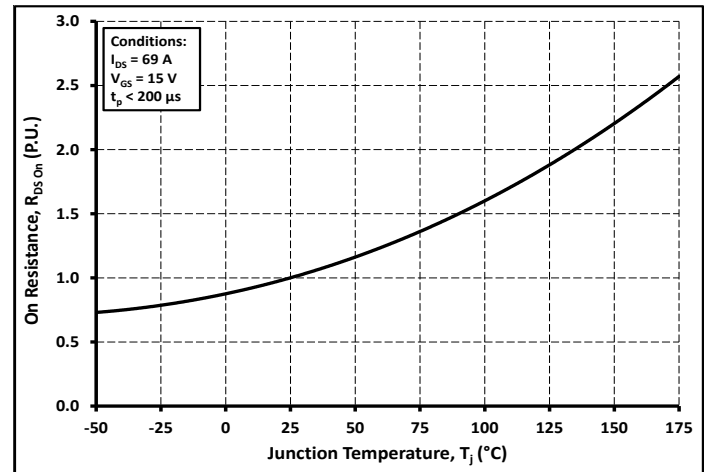
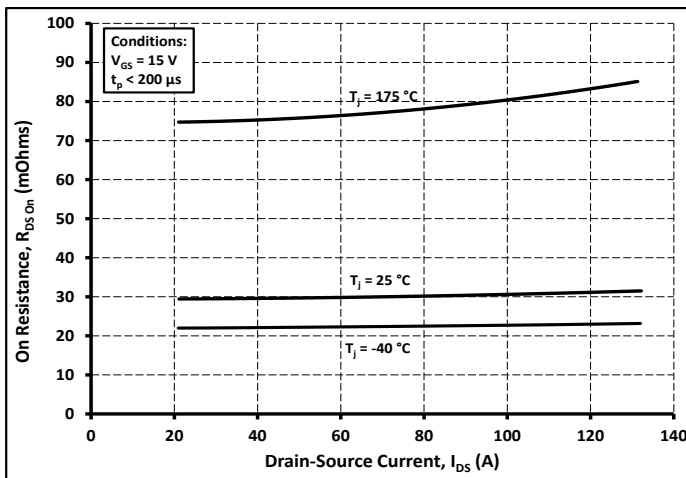
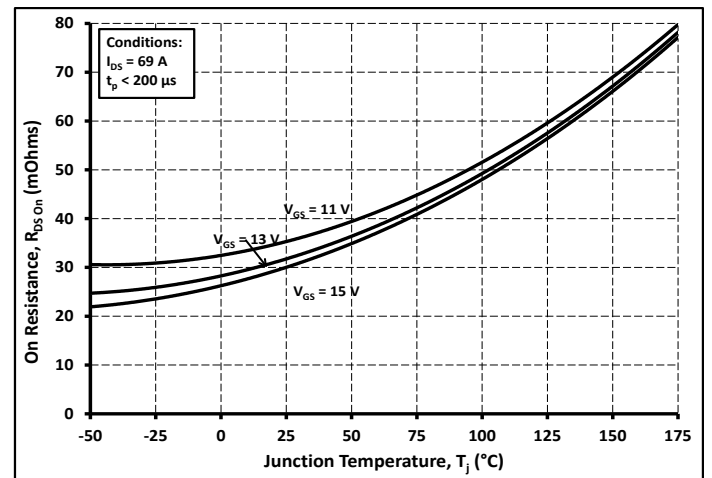
Figure 1. Output Characteristics $T_j = -40^\circ\text{C}$ Figure 2. Output Characteristics $T_j = 25^\circ\text{C}$ Figure 3. Output Characteristics $T_j = 175^\circ\text{C}$ 

Figure 4. Normalized On-Resistance vs. Temperature

Figure 5. On-Resistance vs. Drain Current
For Various TemperaturesFigure 6. On-Resistance vs. Temperature
For Various Gate Voltage

Typical Performance

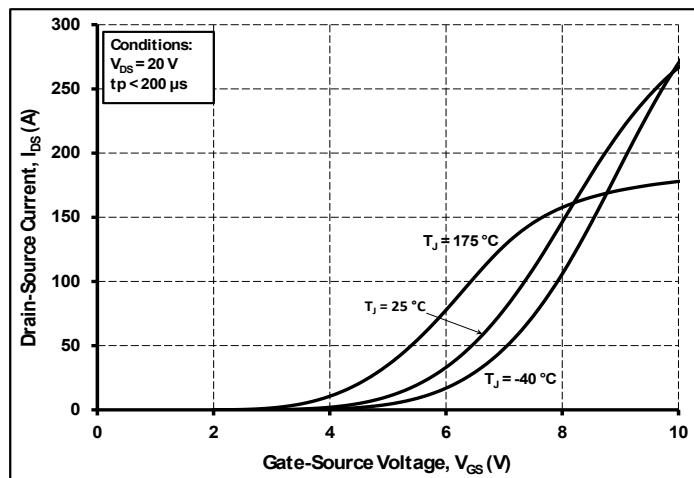


Figure 7. Transfer Characteristic for Various Junction Temperatures

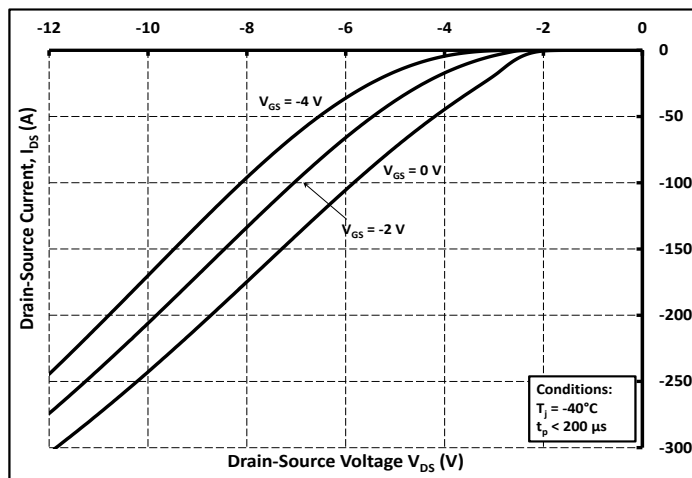
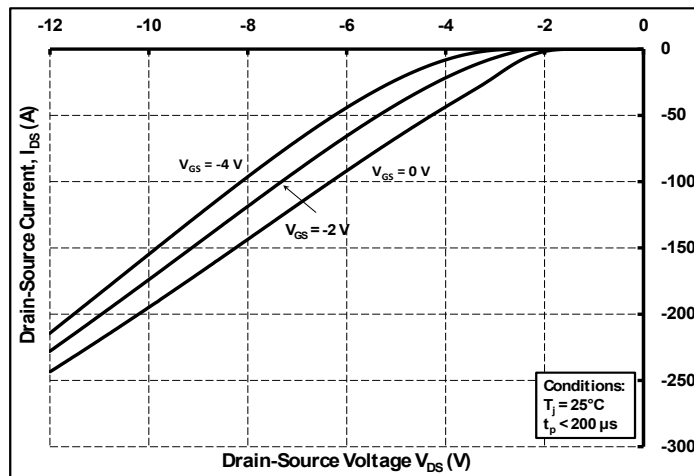
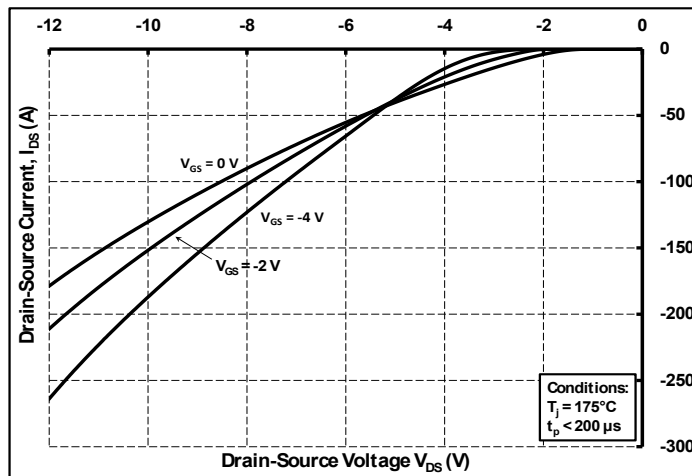
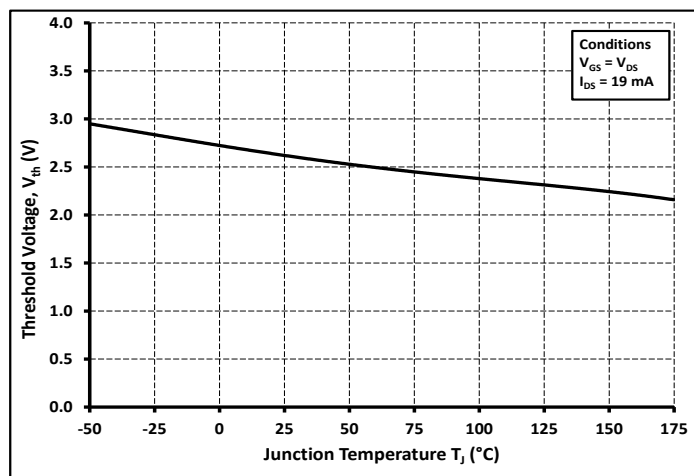
Figure 8. Body Diode Characteristic at -40°C Figure 9. Body Diode Characteristic at 25°C Figure 10. Body Diode Characteristic at 175°C 

Figure 11. Threshold Voltage vs. Temperature

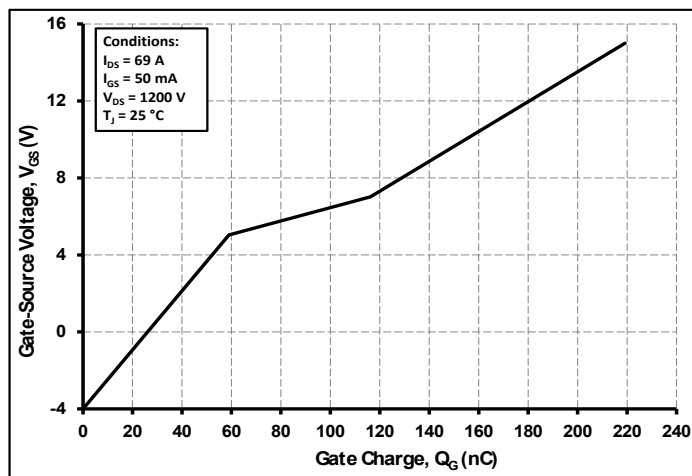


Figure 12. Gate Charge Characteristics

Typical Performance

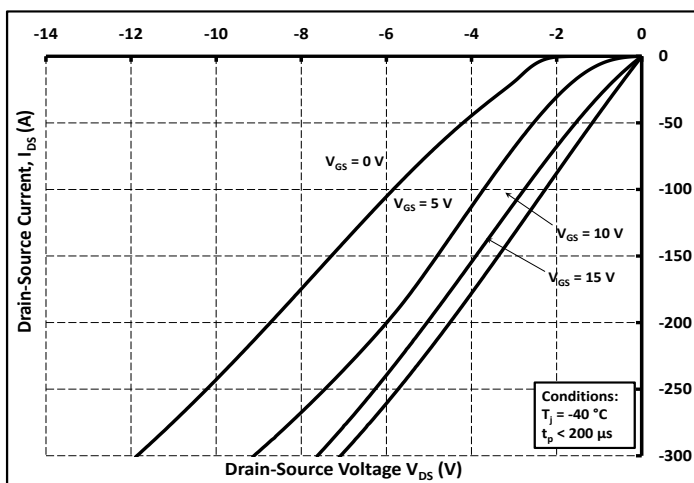
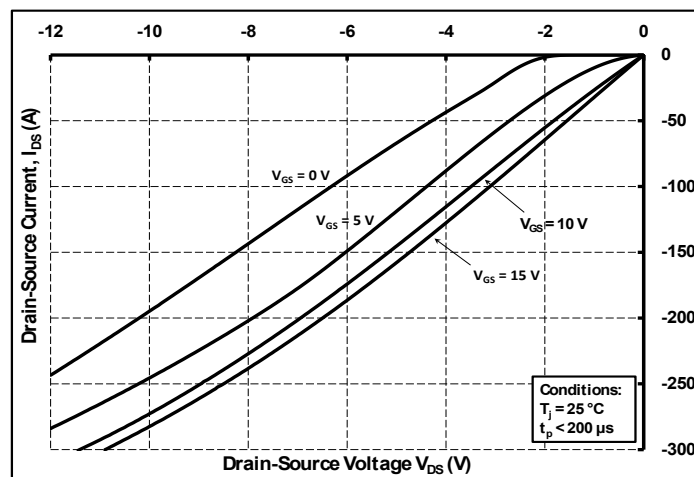
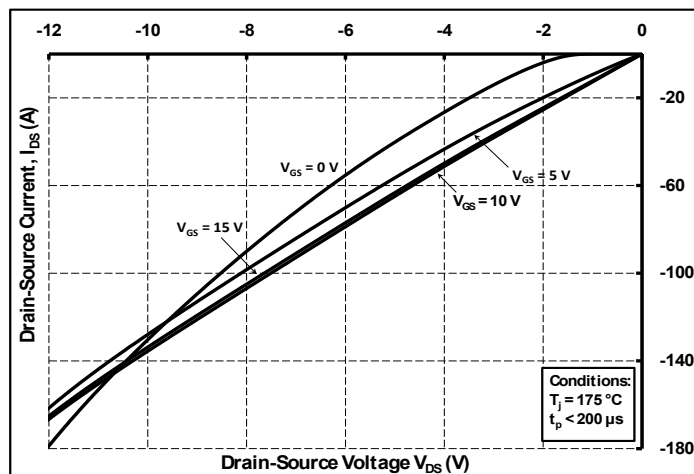
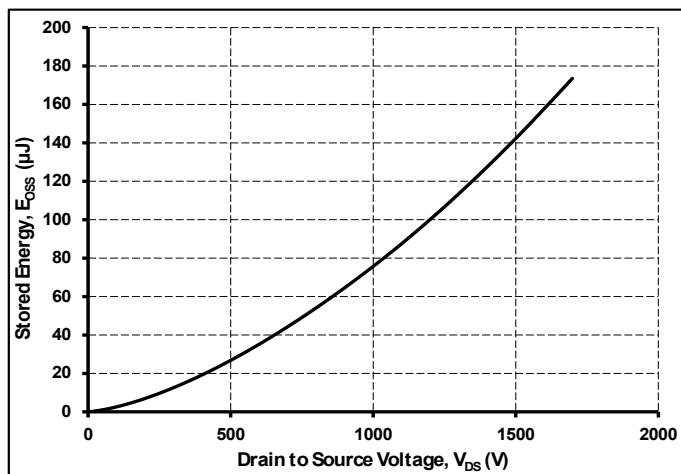
Figure 13. 3rd Quadrant Characteristic at -40°C Figure 14. 3rd Quadrant Characteristic at 25°C Figure 15. 3rd Quadrant Characteristic at 175°C 

Figure 16. Output Capacitor Stored Energy

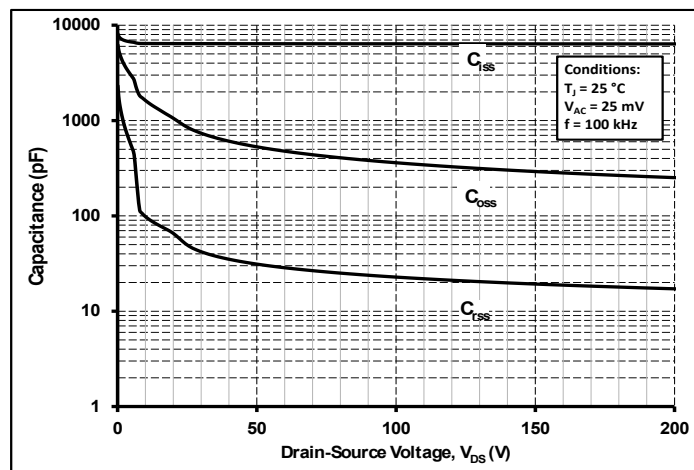


Figure 17. Capacitances vs. Drain-Source Voltage (0 - 200 V)

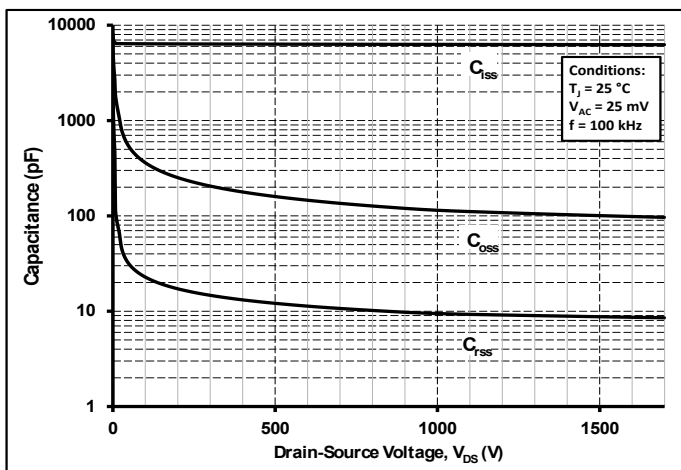


Figure 18. Capacitances vs. Drain-Source Voltage (0 - 1700 V)

Typical Performance

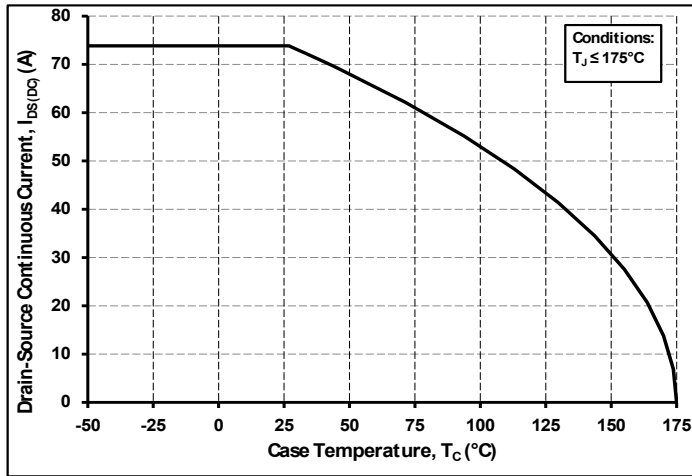


Figure 19. Continuous Drain Current Derating vs. Case Temperature

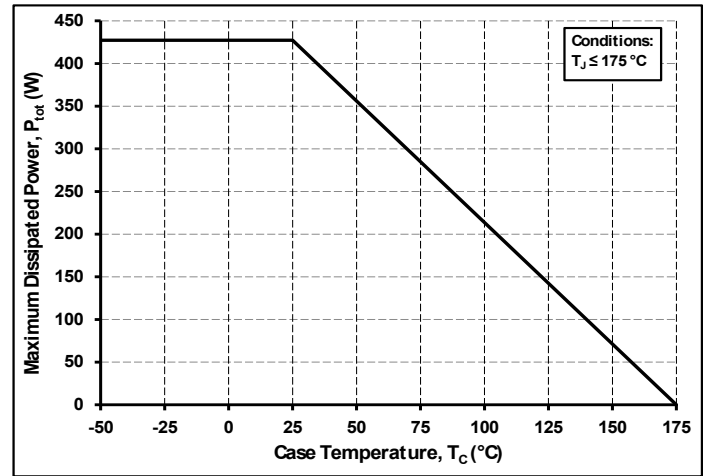


Figure 20. Maximum Power Dissipation Derating vs. Case Temperature

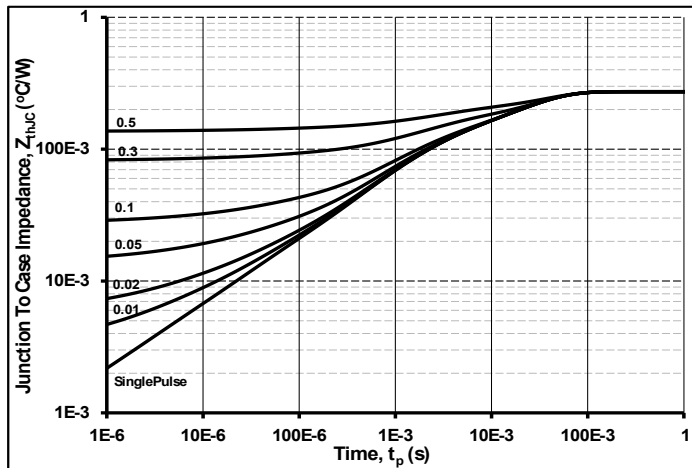


Figure 21. Transient Thermal Impedance (Junction - Case)

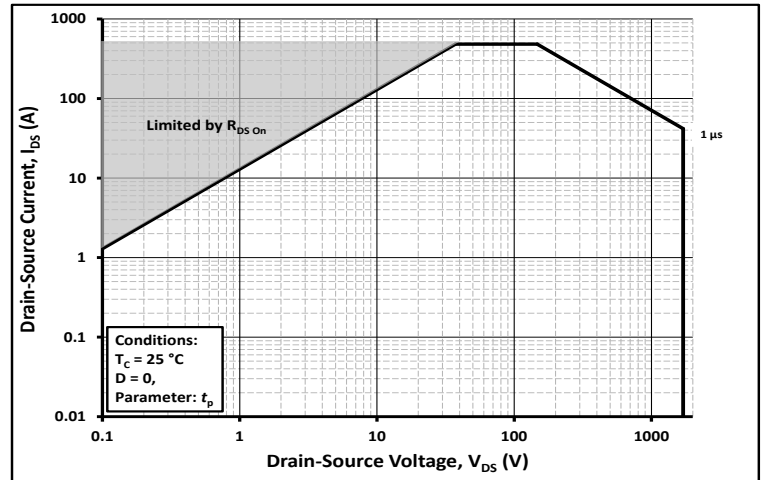
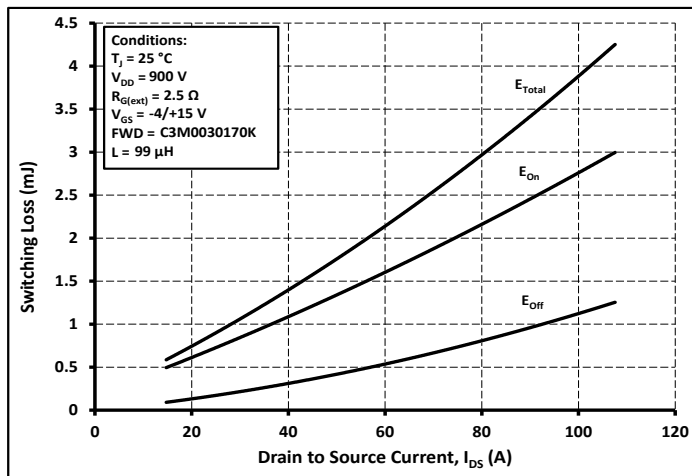
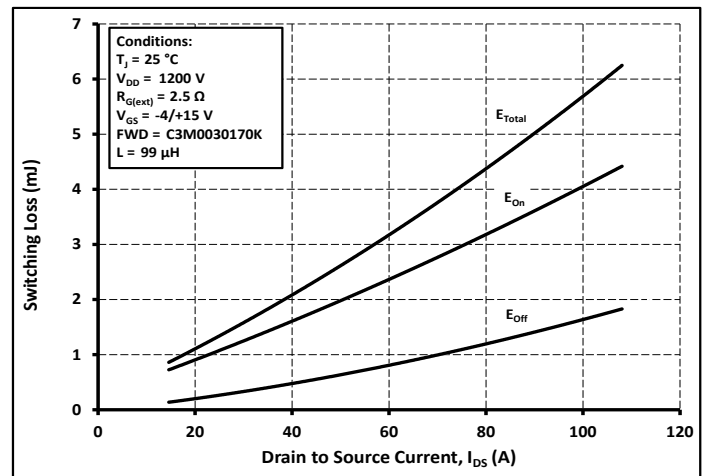


Figure 22. Safe Operating Area

Figure 23. Clamped Inductive Switching Energy vs. Drain Current ($V_{DD} = 900\text{ V}$)Figure 24. Clamped Inductive Switching Energy vs. Drain Current ($V_{DD} = 1200\text{ V}$)

Typical Performance

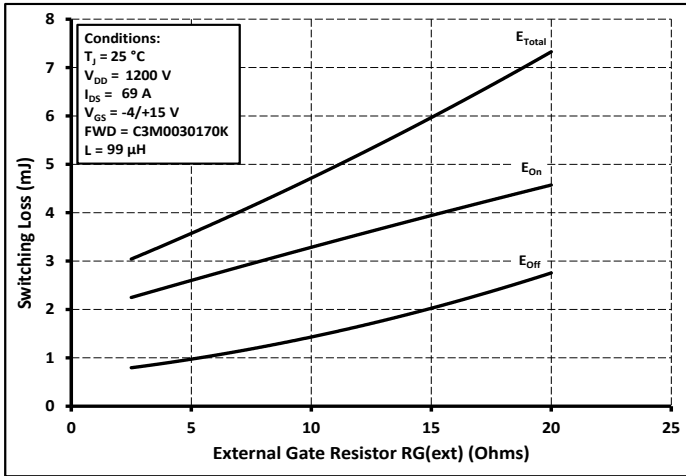
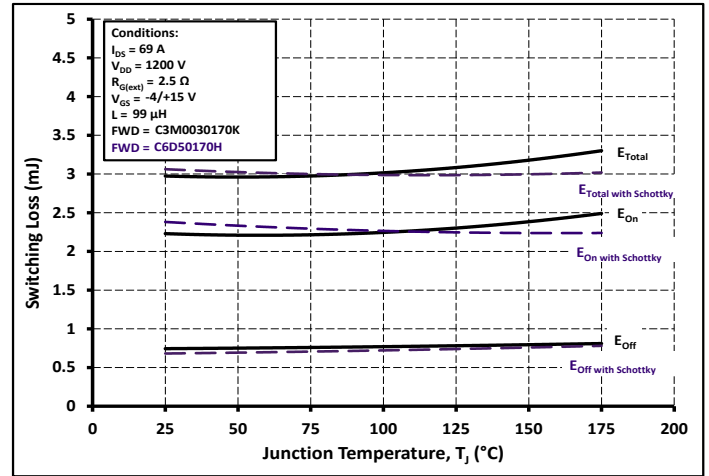
Figure 25. Clamped Inductive Switching Energy vs. $R_{G(\text{ext})}$ 

Figure 26. Clamped Inductive Switching Energy vs. Temperature

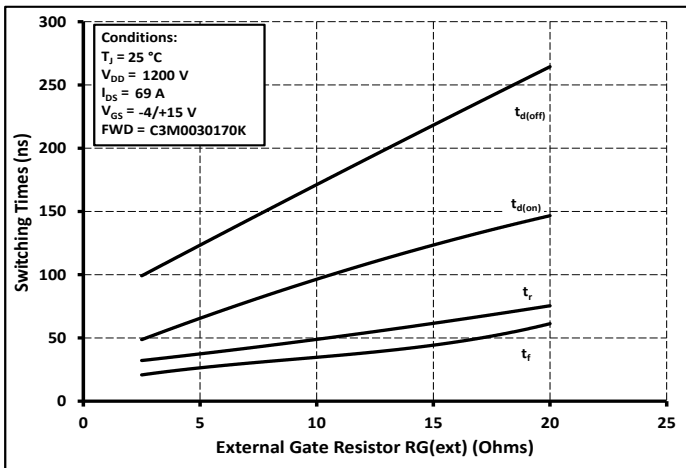
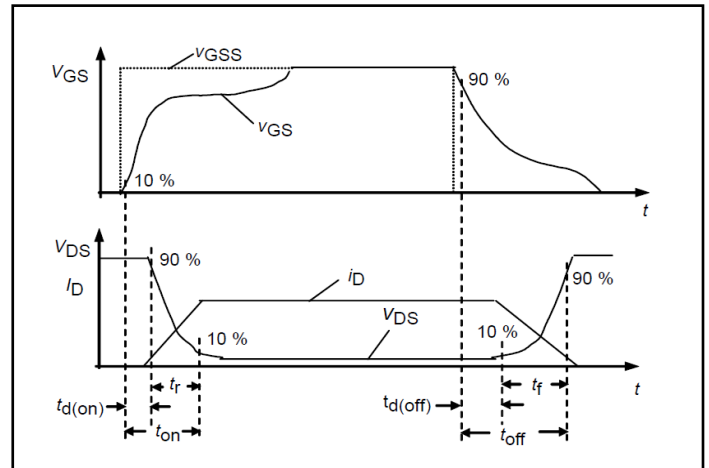
Figure 27. Switching Times vs. $R_{G(\text{ext})}$ 

Figure 28. Switching Times Definition

Test Circuit Schematic

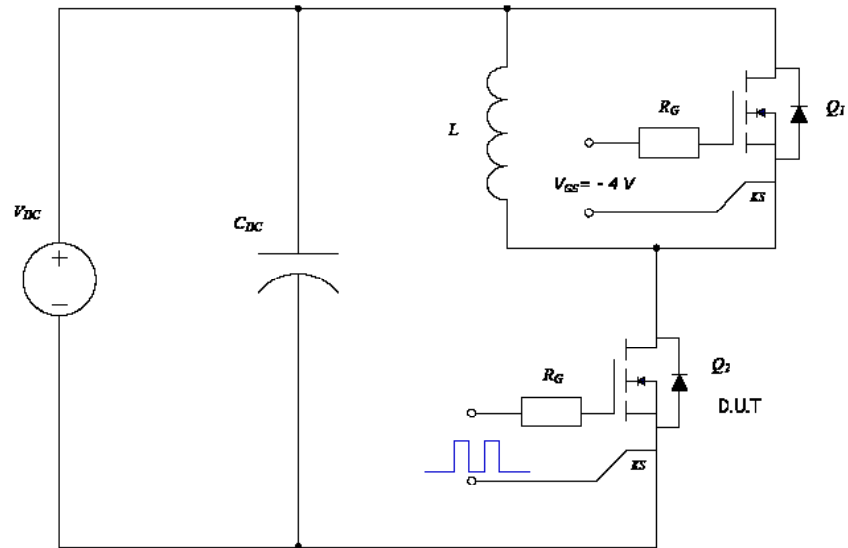
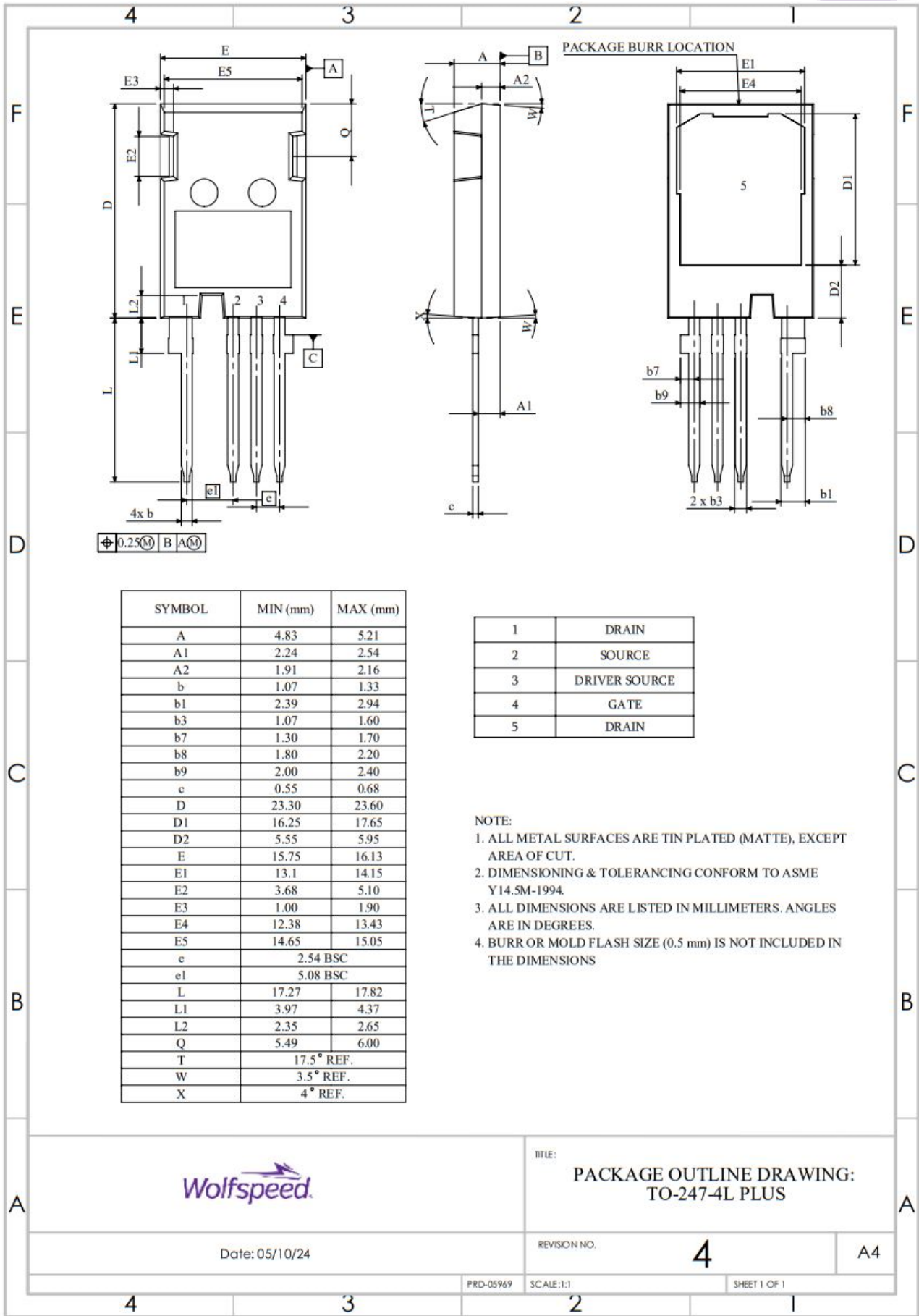


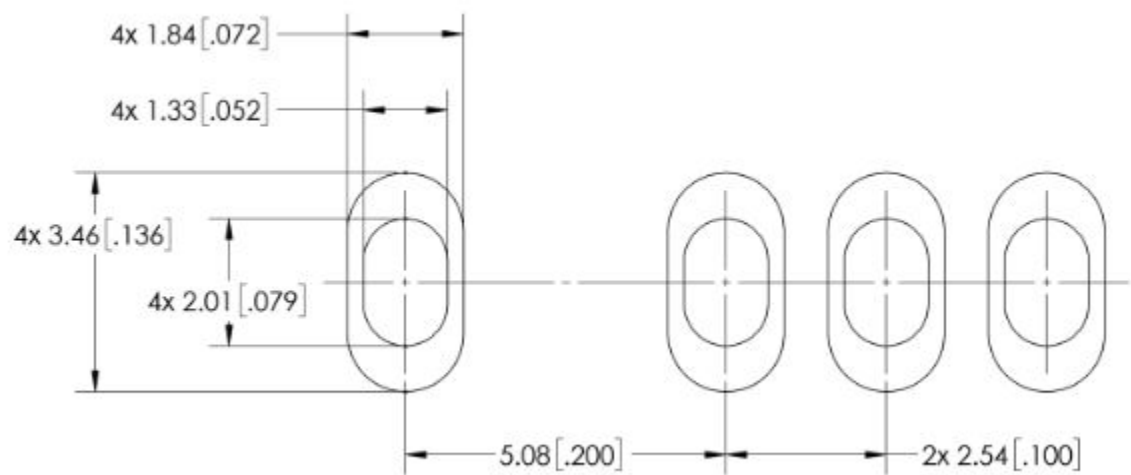
Figure 29. Clamped Inductive Switching Waveform Test Circuit

Note:

Turn-off and Turn-on switching energy and timing values measured using SiC MOSFET Body Diode as shown above.



Recommended Solder Pad Layout



Revision History

Document Version	Date of Release	Description of Changes
1	August-2025	Initial Release



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