CPM2-1200-0025B

Silicon Carbide Power MOSFET
Z-FET™ MOSFET

N-Channel Enhancement Mode

V_{DS}	1200 V
I_D @ 120°C	50 A
$R_{DS(on)}$	25 mΩ

Features

- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low $R_{DS(on)}$
- Easy to Parallel and Simple to Drive
- Avalanche Ruggedness
- Resistant to Latch-Up
- Halogen Free, RoHS Compliant

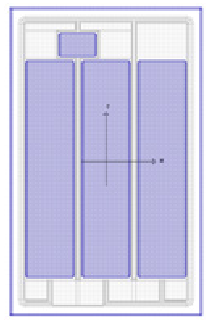
Benefits

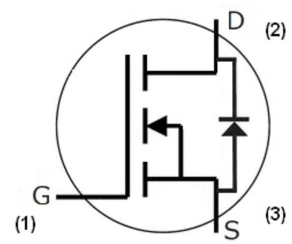
- Higher System Efficiency
- Reduced Cooling Requirements
- Increased System Switching Frequency

Applications

- Solar Inverters
- High Voltage DC/DC Converters
- Motor Drives
- EV Chargers
- UPS

Package





Part Number	Package
CPM2-1200-0025B	Die

Maximum Ratings (T_C = 25 °C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
$I_{DS\ (DC)}$	Continuous Drain Current	107	A	V_{GS}@20 V, T_C = 25°C	Note 1
		50		V_{GS}@20 V, T_C = 120°C	
$I_{DS\ (pulse)}$	Pulsed Drain Current	150	A	Pulse width t_P limited by T_{jmax} T_C = 25°C	
V_{GS}	Gate Source Voltage	-10/+25	V		
T_J , T_{stg}	Operating Junction and Storage Temperature	-55 to +150	°C		
T_L	Solder Temperature	260	°C		

Note (1): Assumes a $R_{\theta JC}$ < 0.32 K/W

Electrical Characteristics (T_C = 25˚C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	1200			V	V_{GS} = 0 V, I_D = 100 μA	
$V_{GS(th)}$	Gate Threshold Voltage	1.9	2.3		V	V_{DS} = 10V, I_D = 1 mA	
			1.6			V_{DS} = 10V, I_D = 10 mA	
			TBD			V_{DS} = 10V, I_D = 1 mA	
I_{DSS}	Zero Gate Voltage Drain Current		2	100	μA	V_{DS} = 1200 V, V_{GS} = 0 V	
			TBD	TBD		V_{DS} = 1200 V, V_{GS} = 0 V T_J = 150ºC	
I_{GSS}	Gate-Source Leakage Current			0.5	μA	V_{GS} = 20 V, V_{DS} = 0 V	
$R_{DS(on)}$	Drain-Source On-State Resistance		25	34	mΩ	V_{GS} = 20 V, I_D = 50 A	Fig. 6
			43	63		V_{GS} = 20 V, I_D = 50 A, T_J = 150ºC	
g_{fs}	Transconductance		22		S	V_{DS}= 20 V, I_{DS}= 50 A	Fig. 7
			21			V_{DS}= 20 V, I_{DS}= 50 A, T_J = 150ºC	
C_{iss}	Input Capacitance		2980		pF	V_{GS} = 0 V V_{DS} = 1000 V f = 1 MHz V_{AC} = 25mV	Fig. 15
C_{oss}	Output Capacitance		220				
C_{rss}	Reverse Transfer Capacitance		23				
$t_{d(on)i}$	Turn-on Delay Time		21		ns	V_{DS} = 800 V, V_{GS} = -2/20 V ID = 50A, R_G = 3.8Ω, L= 856 μH Per JEDEC24 pg 27	Fig. 13 Fig. 14 Fig. 17 Note 2
t_{ri}	Rise Time		19				
$t_{d(off)i}$	Turn-off Delay Time		50				
t_{fi}	Fall Time		30				
E_{ON}	Turn-On Switching Loss		1.4		mJ	V_{DS} = 800 V, V_{GS} = -5/20 V I_D = 50A, R_G = 2.5Ω, L= 856 μH Per JEDEC24 pg 27	
E_{OFF}	Turn Off Switching Loss		0.5				
R_G	Internal Gate Resistance		1.5		Ω	f = 1 MHz, V_{AC} = 25 mV	

Built-in SiC Body Diode Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode Forward Voltage	3.5		V	V_{GS} = -5 V, I_F=25 A, T_J = 25 ºC	
		3.1			V_{GS} = -2 V, I_F=25 A, T_J = 25 ºC	
t_{rr}	Reverse Recovery Time	TBD		ns	V_{GS} = -5 V, I_F=50 A, T_J = 25 ºC V_R = 800 V, di_F/dt= 350 A/μs	
Q_{rr}	Reverse Recovery Charge	TBD		nC		
I_{rrm}	Peak Reverse Recovery Current	TBD		A		

Gate Charge Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
Q_{gs}	Gate to Source Charge	32		nC	V_{DS} = 800 V, V_{GS} = 0/20 V I_D =20 A Per JEDEC24 pg 27	Fig. 16
Q_{gd}	Gate to Drain Charge	63				
Q_g	Gate Charge Total	179				

Note (2): Tested in a TO-247 Package

Typical Performance

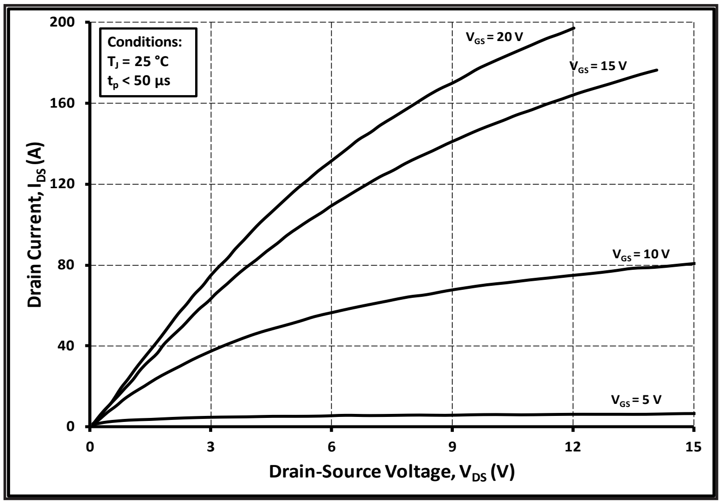


Figure 1. Typical Output Characteristics T_J = 25 ºC

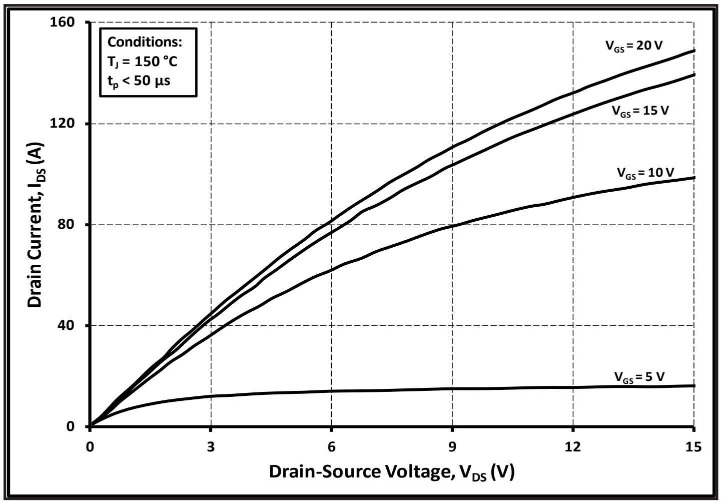


Figure 2. Typical Output Characteristics T_J = 150 ºC

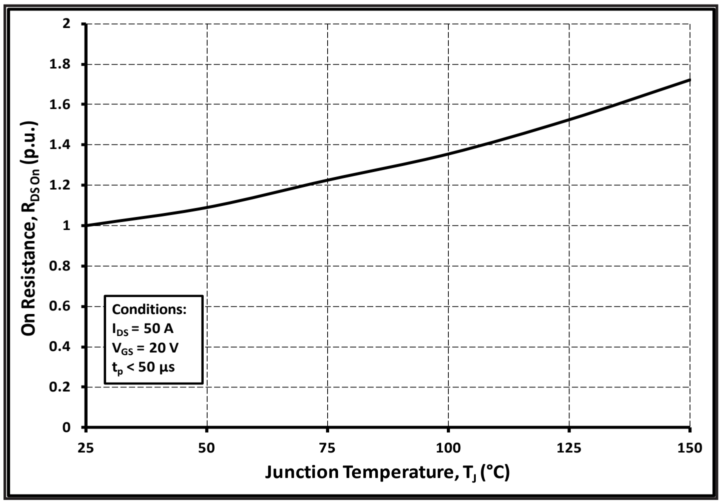


Figure 3. Normalized On-Resistance vs. Temperature

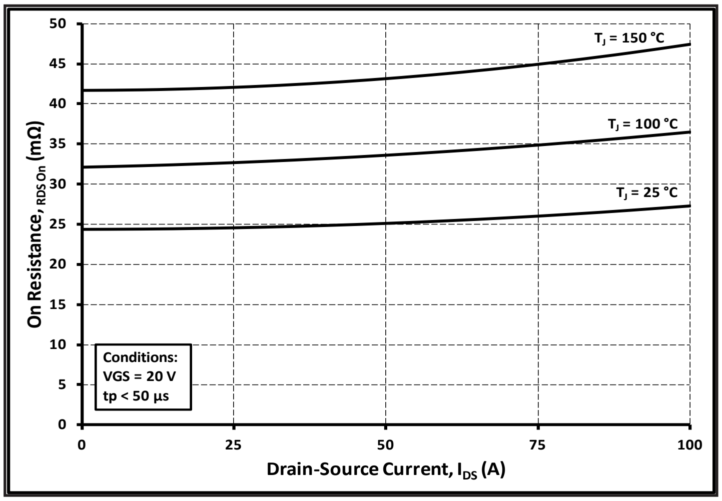


Figure 4. On-Resistance vs. Drain Current

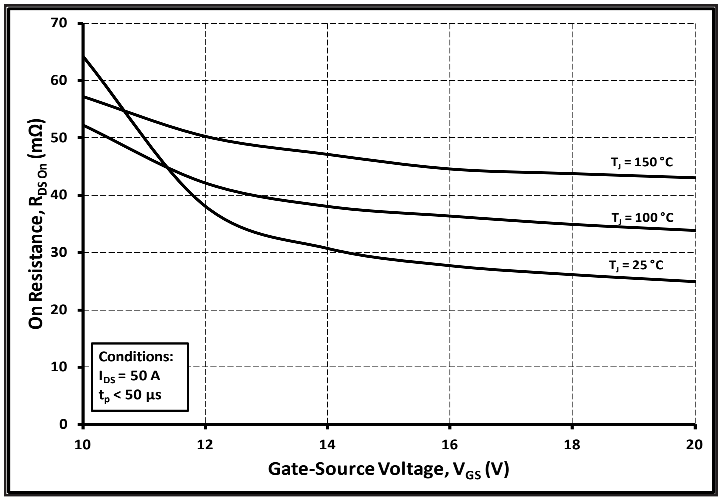


Figure 5. On-Resistance vs. Gate Voltage

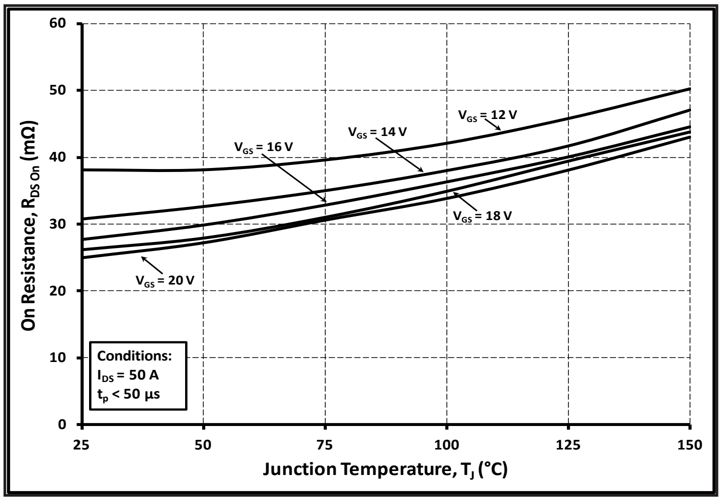


Figure 6. On-Resistance vs. Temperature

Typical Performance

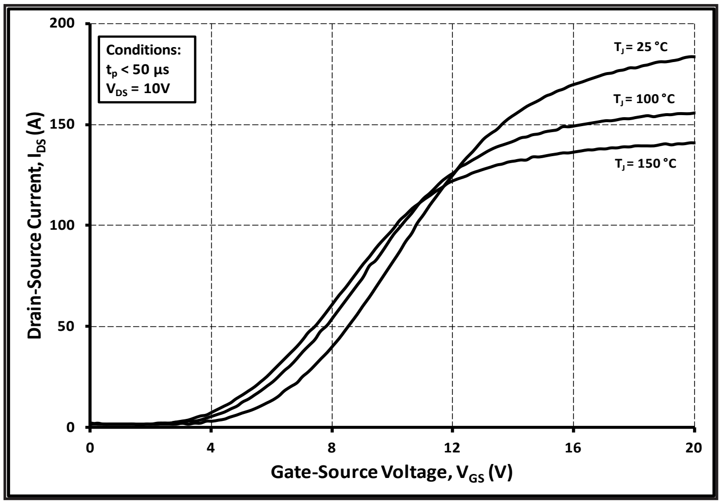


Figure 7. Typical Transfer Characteristics

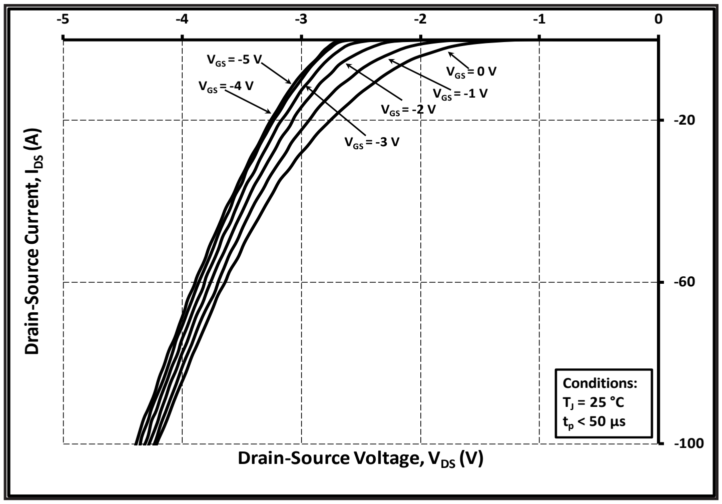


Figure 8. Typical Body Diode Characteristics
T_J = 25 ºC

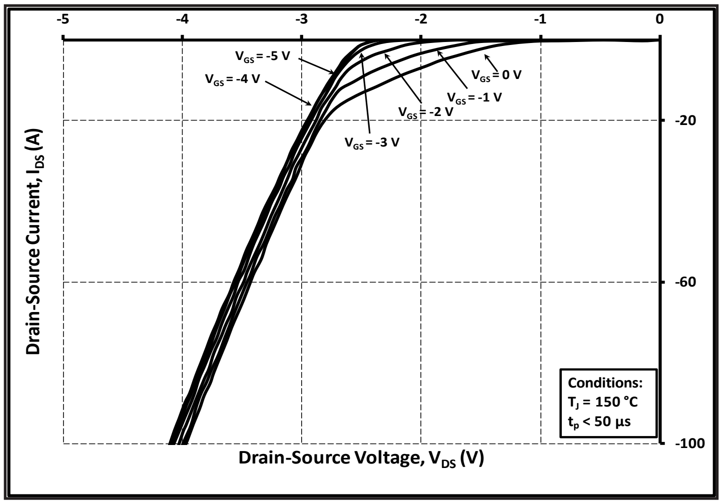


Figure 9. Typical Body Diode Characteristics
T_J = 150 ºC

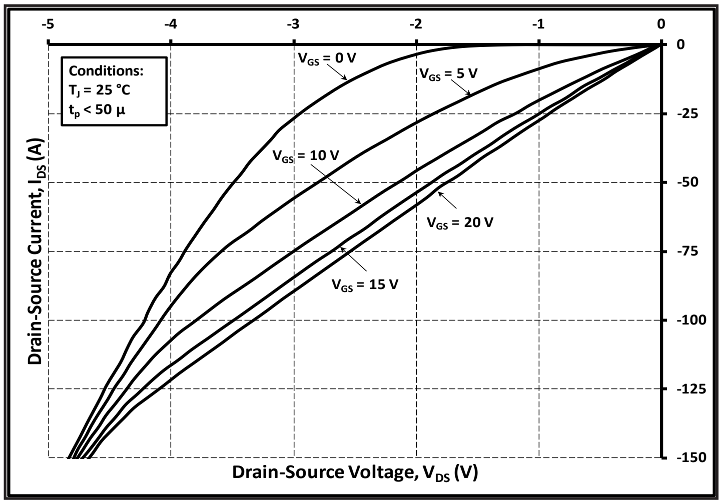


Figure 10. Typical 3rd Quadrant Characteristics
T_J = 25 ºC

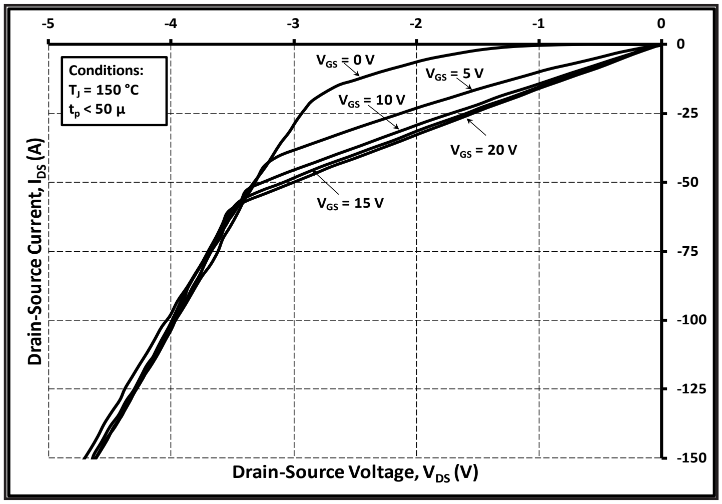


Figure 12. Typical 3rd Quadrant Characteristics
T_J = 150 ºC

Typical Performance

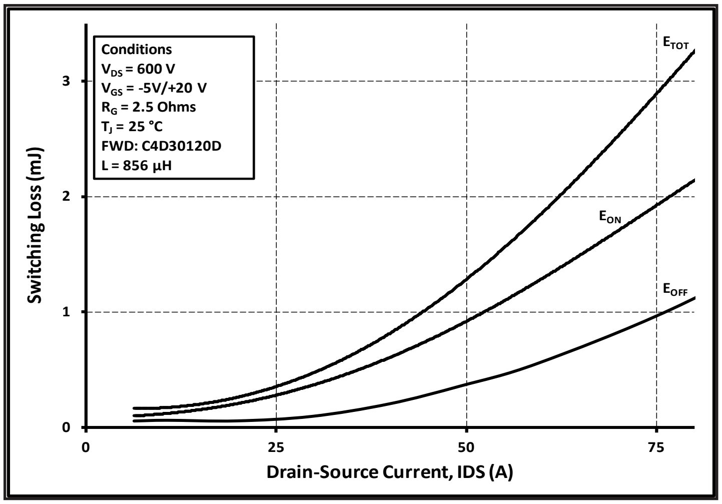


Figure 13. Inductive Switching Loss vs Drain Current V_{DS} = 600V (Note (2))

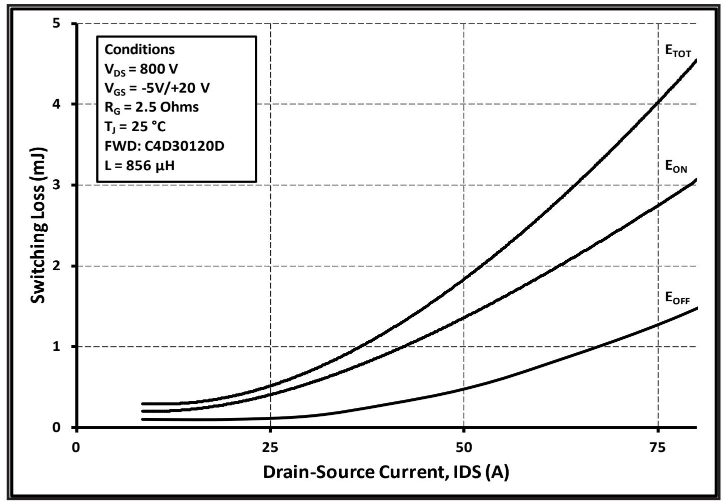
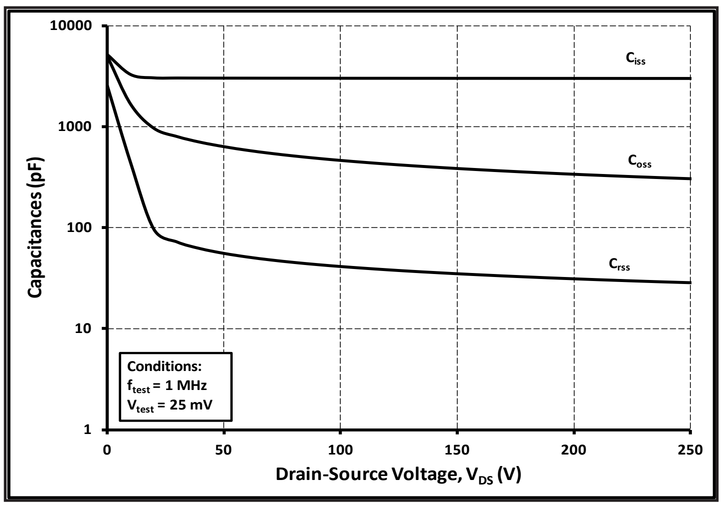


Figure 14. Inductive Switching Loss vs Drain Current V_{DS} = 800V (Note (2))



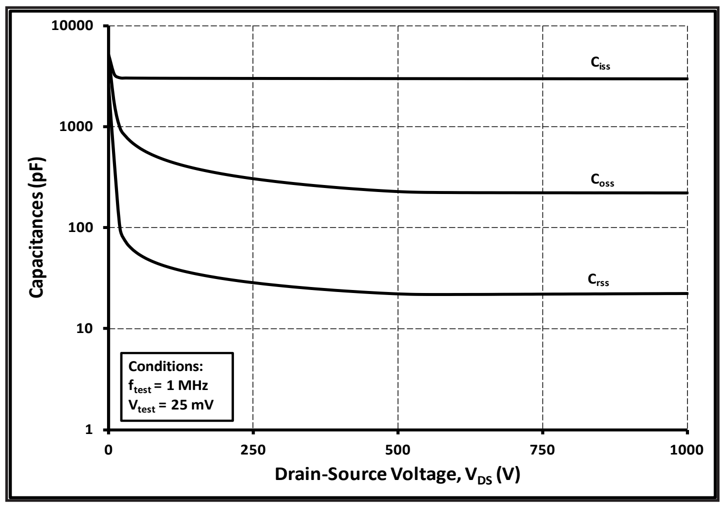


Figure 15A and 15B. Typical Capacitances vs. Drain Voltage at V_{GS} = 0 V and f = 1 MHz

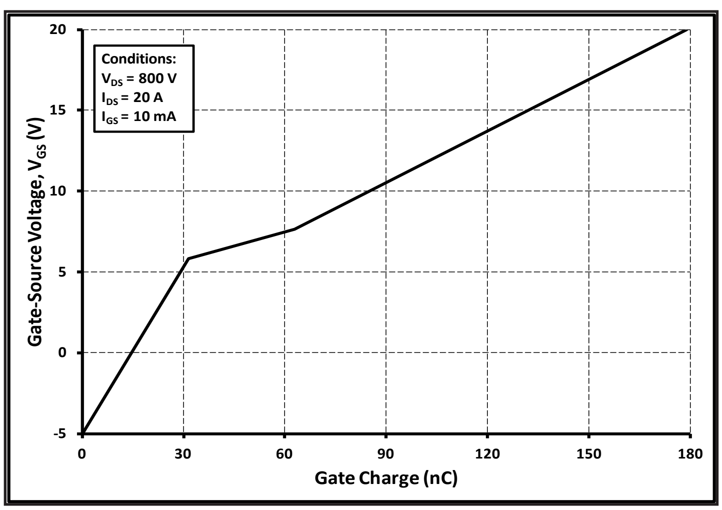


Figure 16. Typical Gate Characteristic 25 ºC

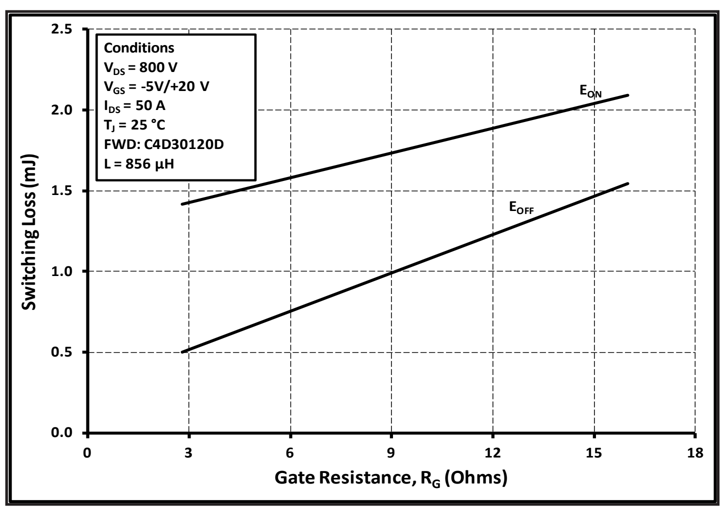


Figure 17. Inductive Switching Loss VS Gate Resistance (Note (2))

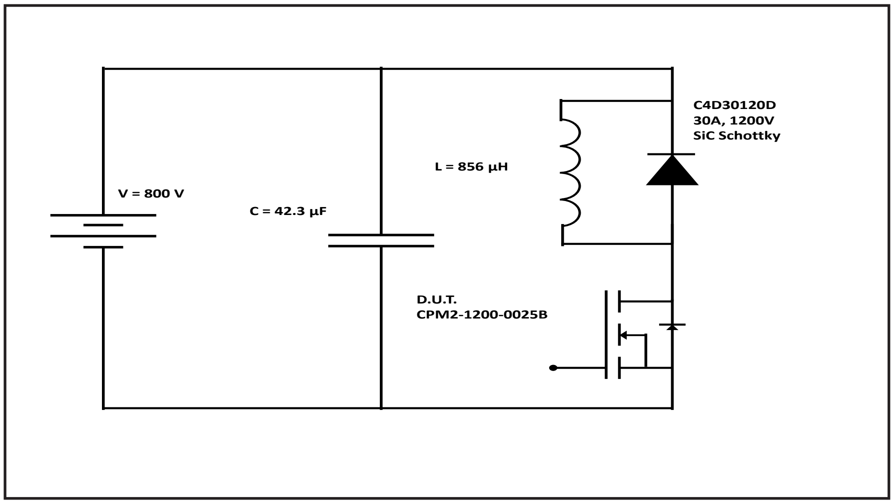


Figure 24. Clamped Inductive Switching Waveform Test Circuit

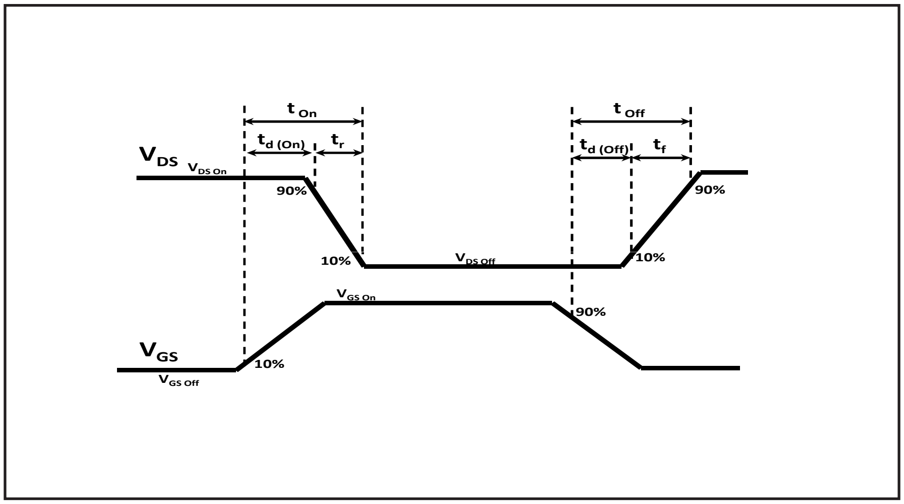


Figure 25. Switching Test Waveforms for Transition Times

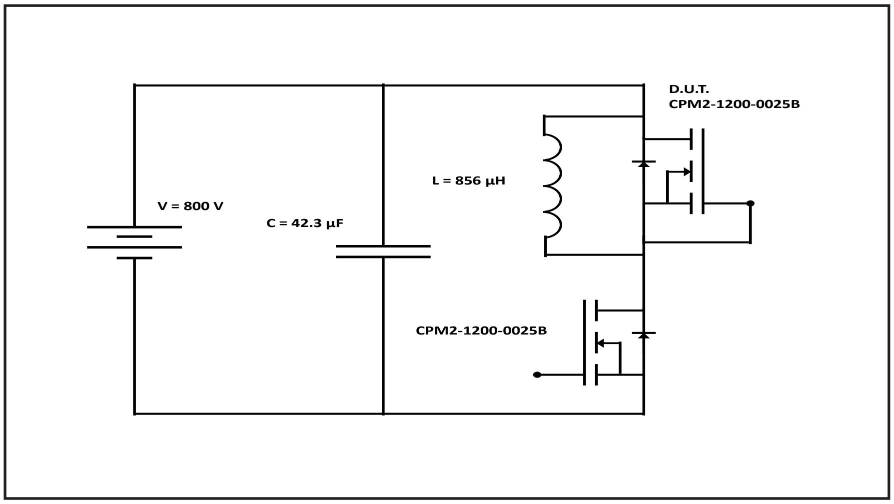
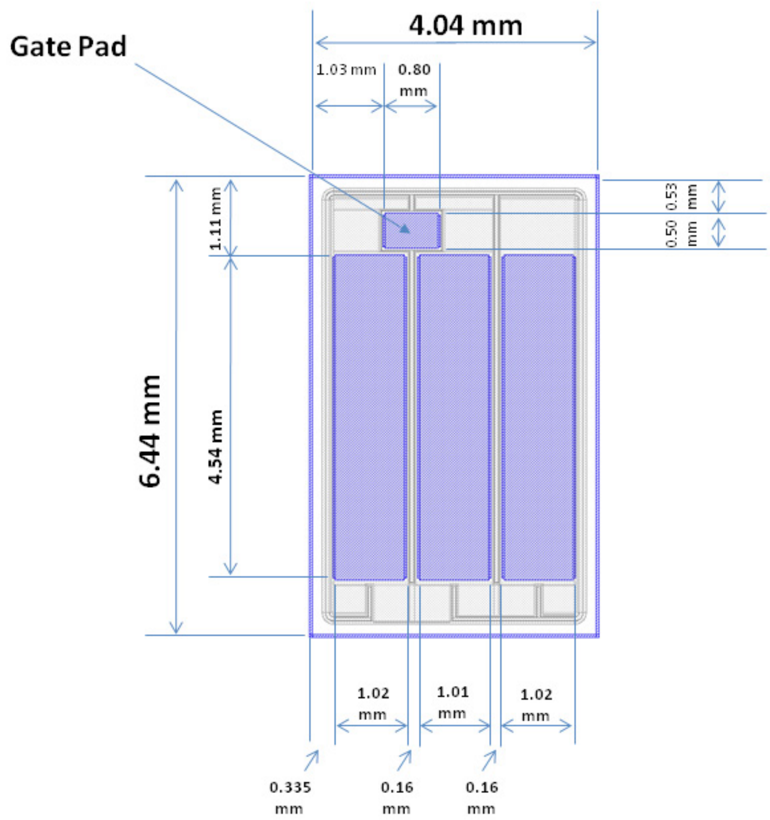


Figure 26. Body Diode Recovery Test Circuit

Mechanical Parameters

Parameter	Typical Value	Unit
Die Dimensions (L x W)	4.04 x 6.44	mm
Exposed Source Pad Metal Dimensions (LxW) Each	1.0 x 4.54 (x3)	mm
Gate Pad Dimensions (L x W)	0.50 x 0.80	mm
Die Thickness	180 ± 40	μm
Top Side Source metallization (Al)	4	μm
Top Side Gate metallization (Al)	4	μm
Bottom Drain metallization (Ni/Ag)	0.8 / 0.6	μm

Chip Dimensions



CPM2-1200-0025B

This product has not been designed or tested for use in, and is not intended for use in, applications implanted into the human body nor in applications in which failure of the product could lead to death, personal injury or property damage, including but not limited to equipment used in the operation of nuclear facilities, life-support machines, cardiac defibrillators or similar emergency medical equipment, aircraft navigation or communication or control systems, air traffic control systems, or weapons systems.

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