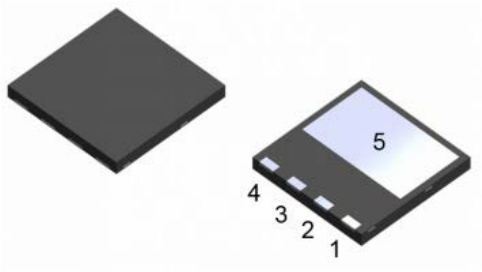
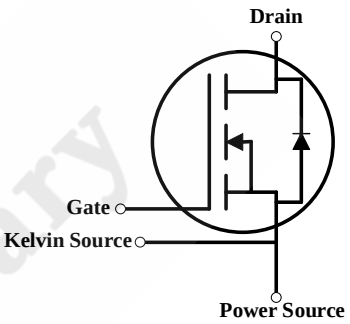
SiC MOS P3M06300D8
N-Channel Enhancement Mode



Features

- High Blocking Voltage with Low On-Resistance
- High-Frequency Operation
- Ultra-Small Q_{gd}
- 100% UIS tested



Benefits

- Improve System Efficiency
- Increase Power Density
- Reduce Heat Sink Requirements
- Reduction of System Cost

DFN8*8

Drain	5
Power Source	3,4
Kelvin Source	2
Gate	1

Applications

- Solar Inverters
- Active Clamp Flyback, LLC resonant, Class D
- Mobile fast-chargers, adapters
- Notebook adaptors
- High Voltage DC/DC Converters
- Switch Mode Power Supplies

Order Information

Part Number	Package	Marking
P3M06300D8	DFN8*8	P3M06300D8

Contents

1. Maximum Ratings

At T_J= 25℃, unless specified otherwise

Parameter	Symbol	Value	Unit	Test Conditions
Drain - Source Voltage	V_{DSmax}	650	V	V_{GS}= -3V I_D= 100μA
Gate - Source Voltage (dynamic)	V_{GSmax}	-8 / +20	V	AC (f>1 Hz)
Gate - Source Voltage (static)	V_{GSop}	-3 / +15	V	Static
Continuous Drain Current	I_D	9	A	V_{GS}= 15V T_C= 25℃
		6		V_{GS}= 15V T_C= 100℃
Power Dissipation	P_D	32	W	
Operating Junction	T_J	-55 To +175	℃	
Storage Temperature	T_{stg}	-55 To +175	℃	
Solder Temperature	T_L	260	℃	

2. Electrical Characteristics

At T_J= 25℃, unless specified otherwise

Parameter	Symbol	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	650	/	/	V	V_{GS}= -3V I_D= 100μA
Gate Threshold Voltage	$V_{GS(th)}$	1.8	2.2	/	V	V_{DS}= V_{GS} I_D= 5mA T_J = 25℃
		/	1.45	/	V	V_{DS}= V_{GS} I_D= 5mA T_J = 175℃
Reverse Bias Drain Current	I_{DSS}	/	0.5	10	μA	V_{GS}= -3V V_{DS}= 650V
Gate-Source Leakage Current	I_{GSS}	/	2	125	nA	V_{GS}= 15V V_{DS}= 0V
Drain-Source On-State Resistance	$R_{DS(on)}$	/	300	500	mΩ	V_{GS}= 15V I_D= 4.5A
Trans conductance	g_{fs}	/	2.7	/	S	V_{DS}= 20V I_{DS}= 4.5A T_J = 25℃
		/	2.3	/		V_{DS}= 20V I_{DS}= 4.5A T_J= 175℃
Input Capacitance	C_{iss}	/	338	/	pF	V_{GS}= 0V V_{DS}= 400V f= 1MHz V_{AC}= 25mV
Output Capacitance	C_{oss}	/	39.4	/		
Reverse Transfer Capacitance	C_{rss}	/	3.35	/		
Coss Stored Energy	E_{oss}	/	5.6	/	μJ	

Parameter	Symbol	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
Turn-on Energy	E_{on}	/	41.3	/	μJ	V_{DS}= 400V V_{GS}= -3/15V I_D= 5A R_G= 1Ω
Turn-off Energy	E_{off}	/	2.4	/		
Turn-On Delay Time	$T_{d(on)}$	/	9.4	/	ns	V_{DS}= 400V V_{GS}= -3/15V I_D= 5A R_G= 1Ω
Rise Time	T_r	/	12.3	/		
Turn-Off Delay Time	$T_{d(off)}$	/	13.4	/		
Fall Time	T_f	/	30.7	/		
Internal Gate Resistance	$R_{G(int)}$	/	23.2	/	Ω	f= 1MHz V_{AC}= 25mV
Gate to Source Charge	Q_{gs}	/	2.45	/	nC	V_{DS}= 400V I_{DS}= 4.5A V_{GS}= -3 to 15V I_G= 4mA
Gate to Drain Charge	Q_{gd}	/	2.75	/		
Total Gate Charge	Q_g	/	9.04	/		

3. Reverse Diode Characteristics

At T_J= 25℃, unless specified otherwise

Parameter	Symbol	Value		Unit	Test Conditions
		Typ.	Max.		
Diode Forward Voltage	V_{SD}	4.5	/	V	V_{GS}= -3V I_{SD}= 2.75A T_J = 25℃
		4	/	V	V_{GS}= -3V I_{SD}= 2.75A T_J= 175℃

Continuous Diode Forward Current	I_S	6	/	A	V_{GS}= -3V
Reverse Recover Time	t_{rr}	13.9	/	ns	V_{GS}= -3V I_{SD}= 5A V_R= 400V di_f/dt= 2200A/μs T_J= 25℃
Reverse Recovery Charge	Q_{rr}	202.9	/	nC	
Peak Reverse Recovery Current	I_{rrm}	23.5	/	A	

4. Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction to Case	$R_{\theta JC}$	4.67	℃/W

5. Typical Performance

At T_J= 25℃, unless specified otherwise

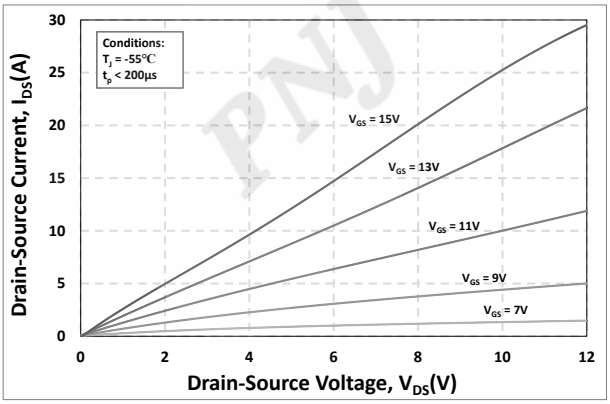


Figure 1. Output Characteristics T_J = -55℃

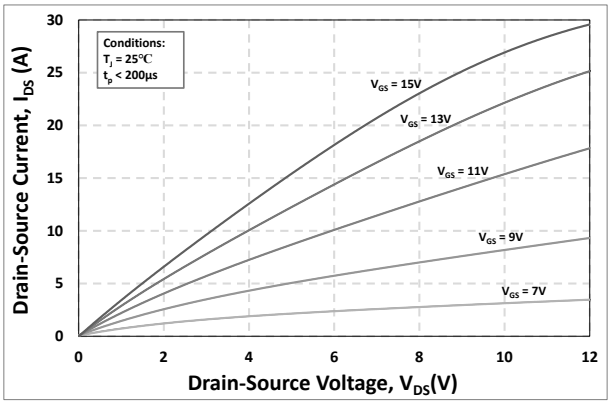


Figure 2. Output Characteristics T_J = 25℃

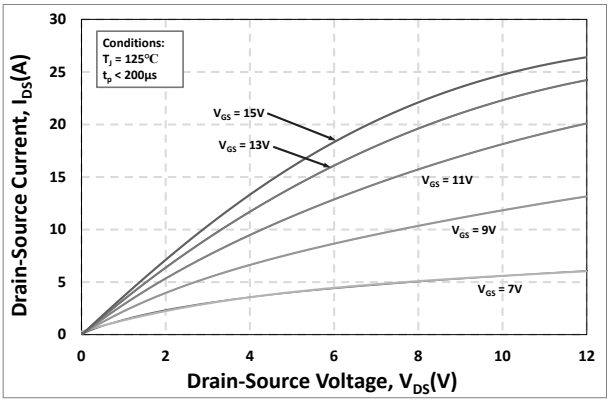


Figure 3. Output Characteristics T_J = 125°C

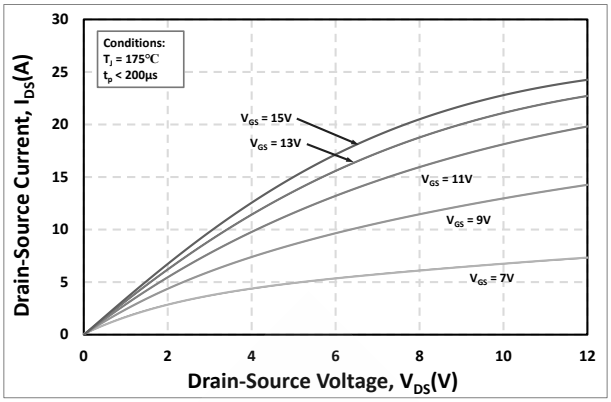


Figure 4. Output Characteristics T_J = 175°C

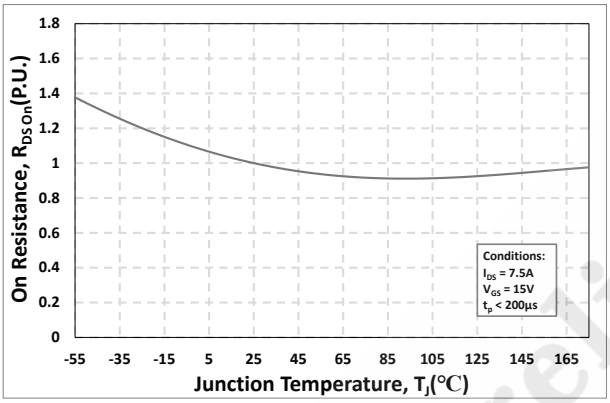


Figure 5. Normalized On-Resistance vs. Temperature

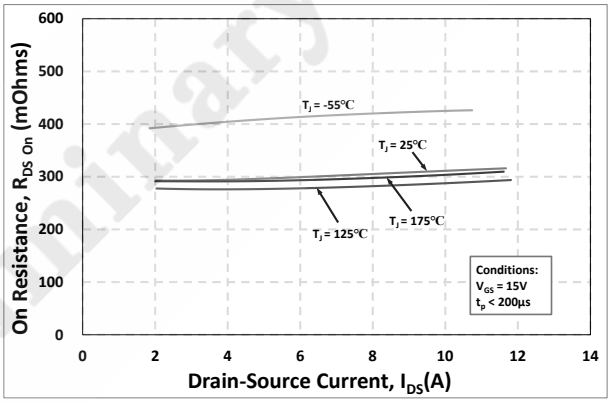


Figure 6. On-Resistance vs. Drain Current Various Temperatures

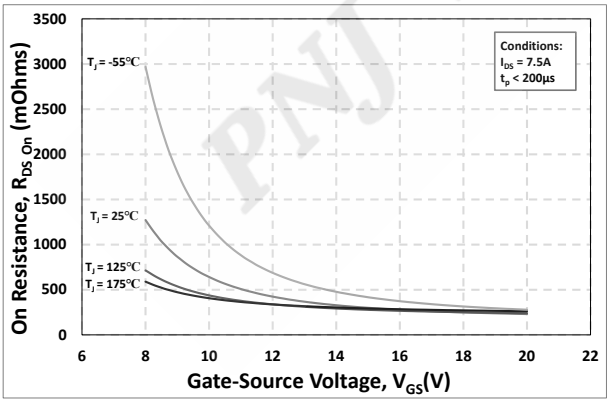


Figure 7. On-Resistance vs. Gate-Source Voltage

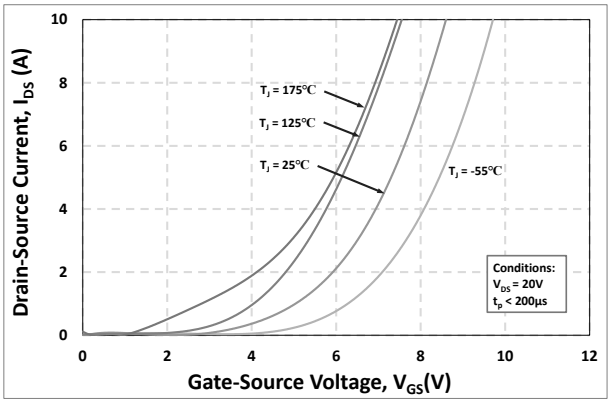


Figure 8. Transfer Characteristic for Various Junction Temperatures

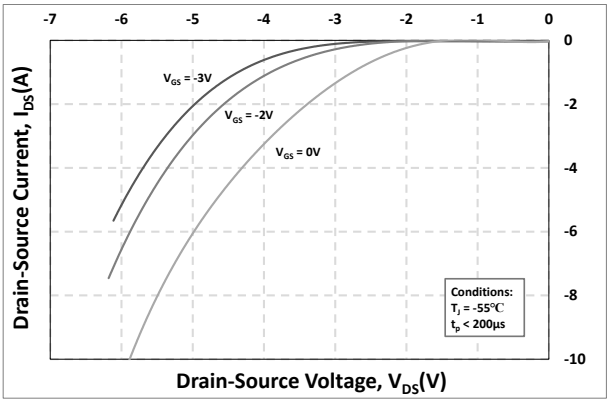


Figure 9. Body Diode Characteristic at -55°C

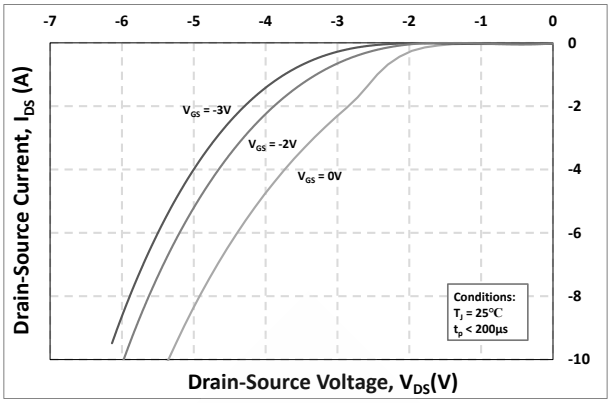


Figure 10. Body Diode Characteristic at 25°C

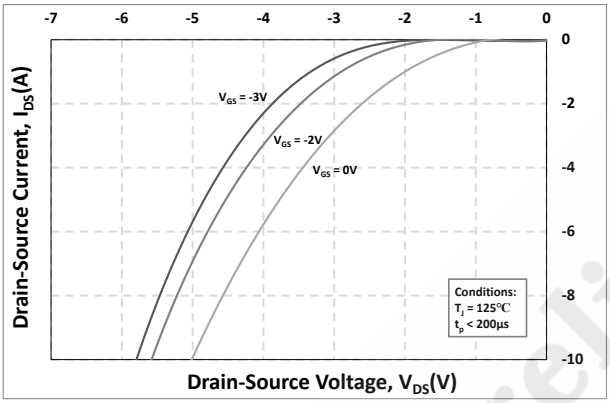


Figure 11. Body Diode Characteristic at 125°C

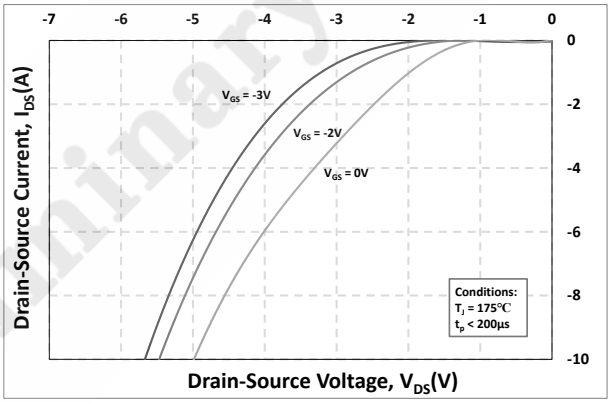


Figure 12. Body Diode Characteristic at 175°C

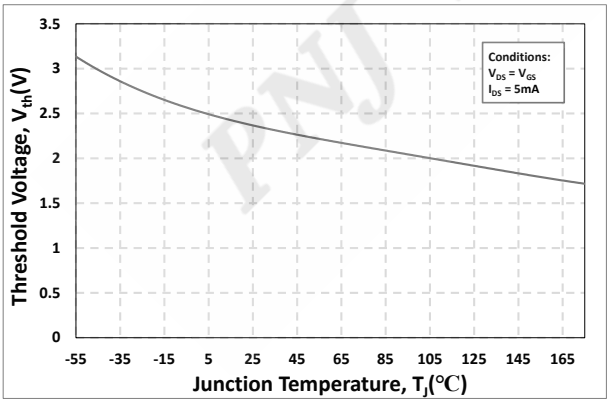


Figure 13. Threshold Voltage vs. Temperature

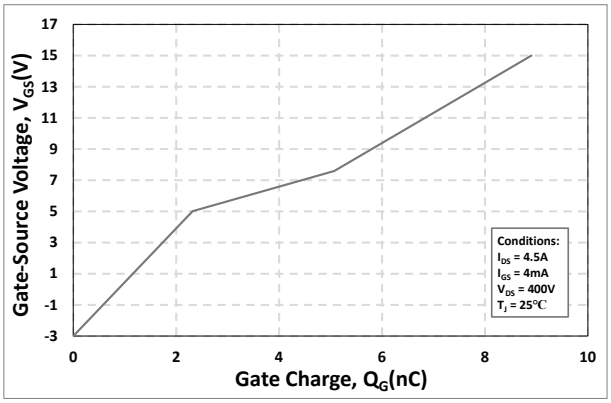


Figure 14. Gate Charge Characteristics

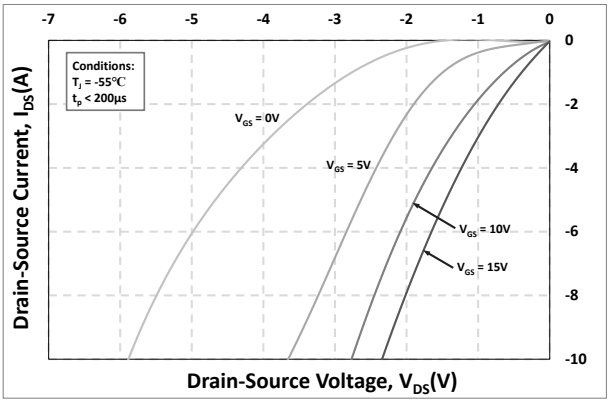


Figure 15. 3rd Quadrant Characteristic at -55°C

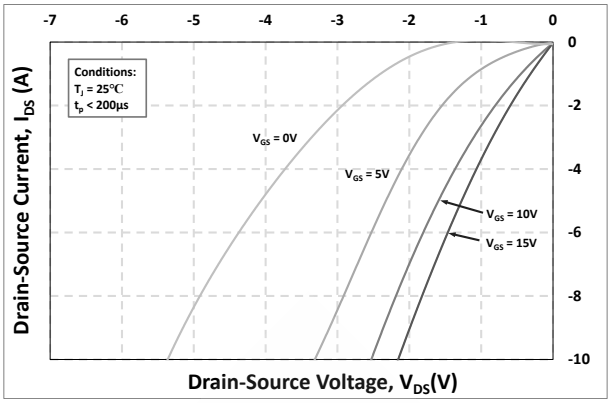


Figure 16. 3rd Quadrant Characteristic at 25°C

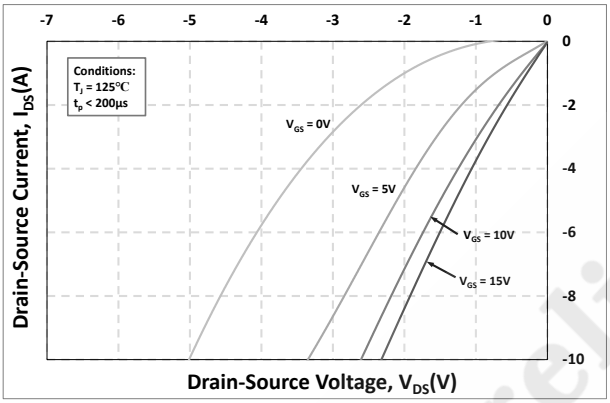


Figure 17. 3rd Quadrant Characteristic at 125°C

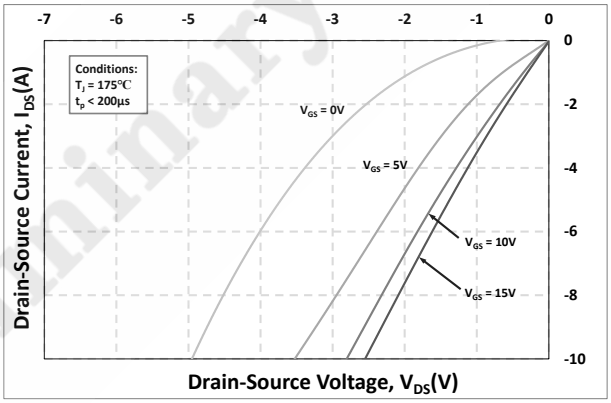


Figure 18. 3rd Quadrant Characteristic at 175ºC

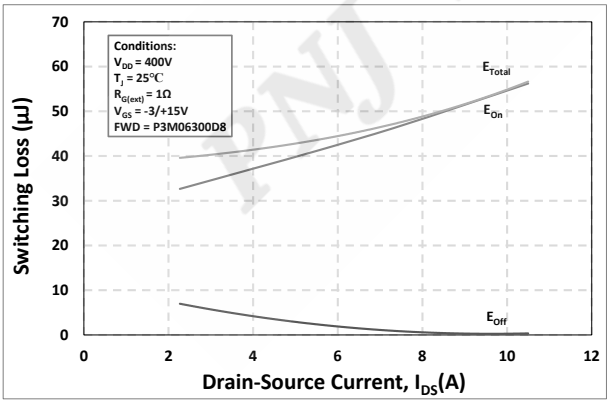


Figure 19. Clamped Inductive Switching Energy vs. Drain Current (V_{DD}= 400V)

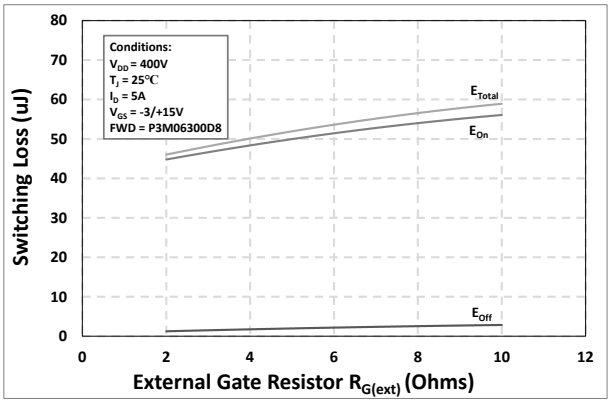


Figure 20. Clamped Inductive Switching Energy vs. $R_{G(ext)}$

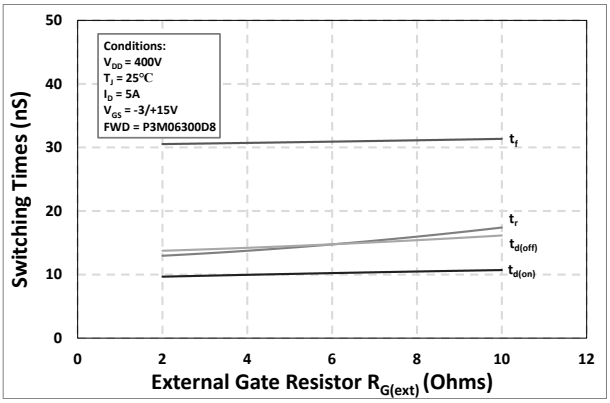


Figure 21. Switching Times vs. $R_{G(ext)}$

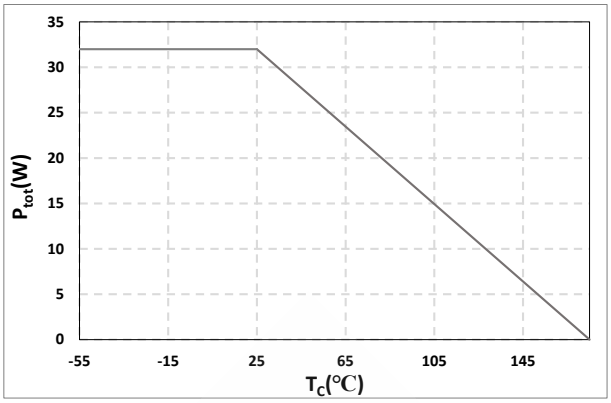


Figure 22. Maximum Power Dissipation Derating vs. Case Temperature

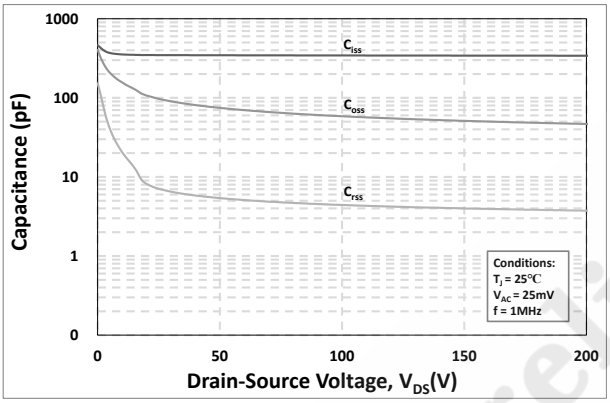


Figure 23. Capacitances vs. Drain-Source Voltage (0 - 200V)

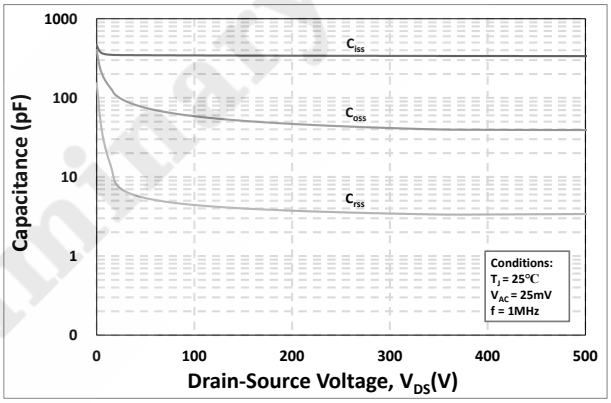


Figure 24. Capacitances vs. Drain-Source Voltage (0 - 500V)

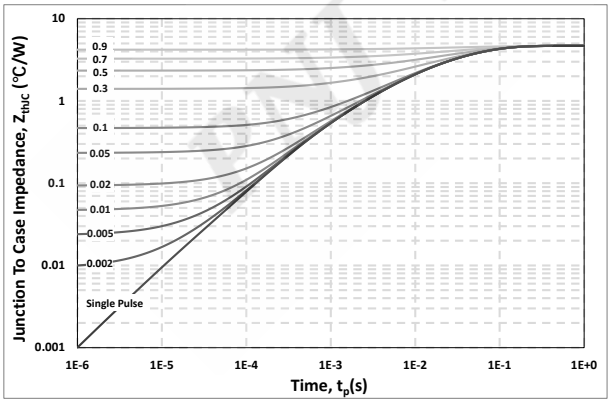


Figure 25. Transient Thermal Impedance (Junction - Case)

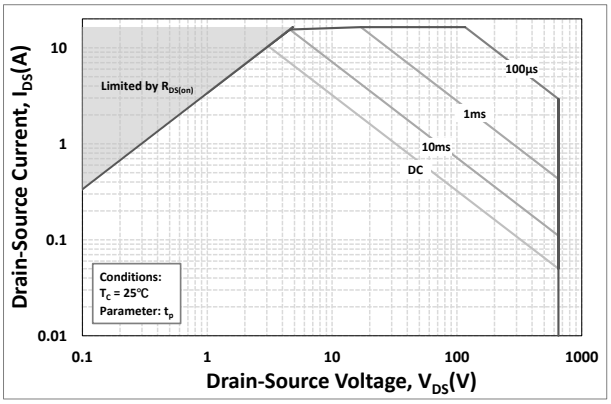


Figure 26. Safe Operating Area

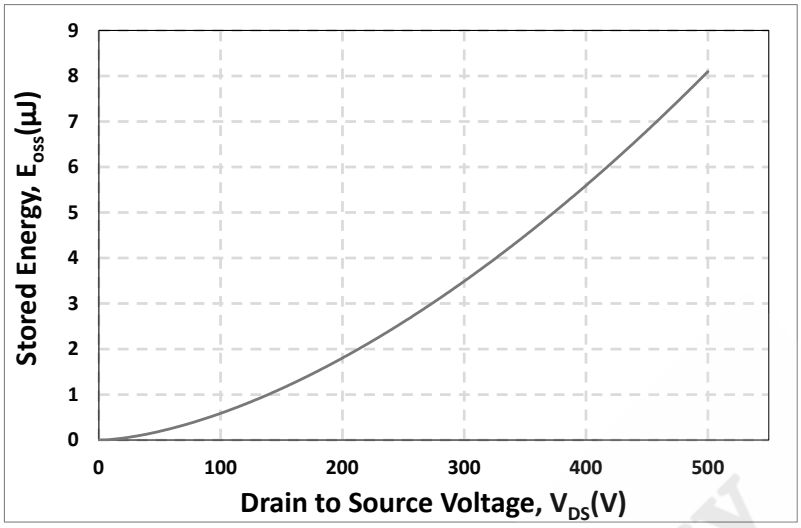


Figure 27. Output Capacitor Stored Energy

6. Definitions

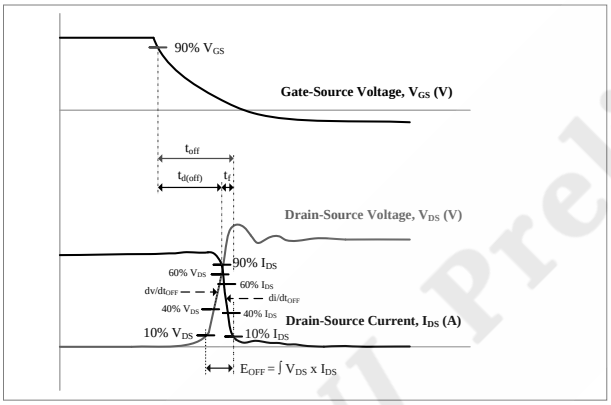


Figure 28. Turn-off Transient Definitions

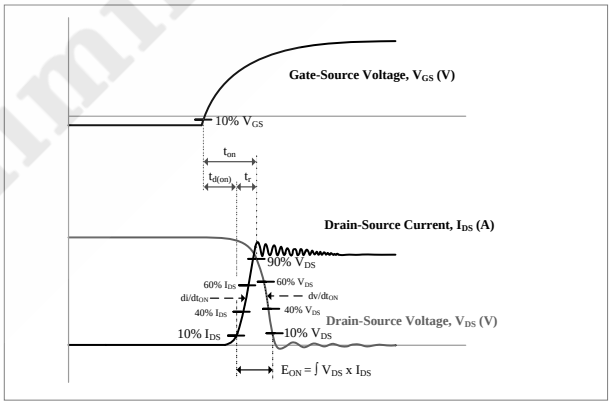


Figure 29. Turn-on Transient Definitions

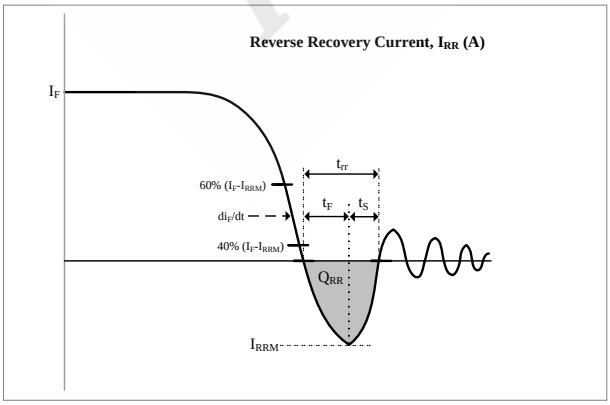


Figure 30. Reverse Recovery Definitions

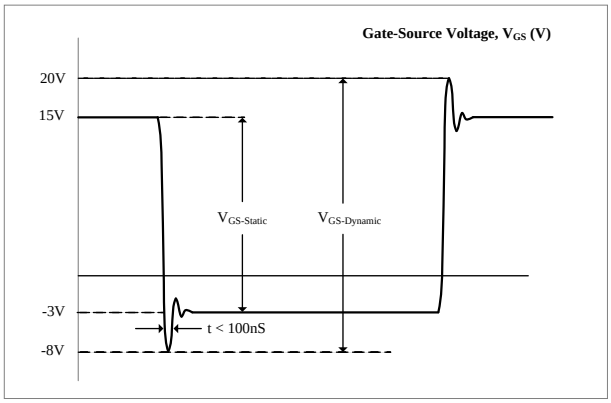
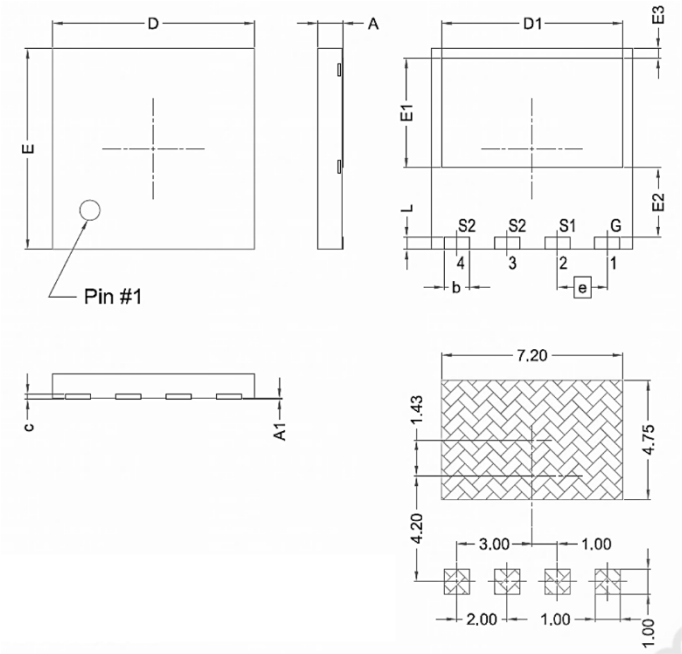


Figure 31. Vgs Transient Definitions

7. Package Outlines



SYMBOL	DIMENSIONS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0.00	—	0.05
b	0.90	1.00	1.10
c	0.10	0.20	0.30
D	7.90	8.00	8.10
D1	7.10	7.20	7.30
E	7.90	8.00	8.10
E1	4.25	4.35	4.45
E2	2.65	2.75	2.85
E3	0.30	0.40	0.50
e	2.00 BSC		
L	0.40	0.50	0.60

Drawing and Dimensions

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