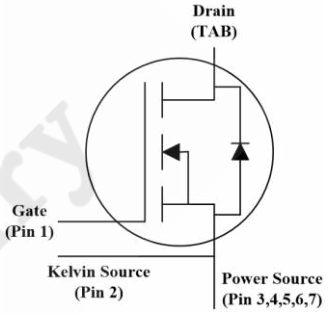
SiC MOS P3M06060G7
N-Channel Enhancement Mode

Features

- Qualified to AEC-Q101
- High Blocking Voltage with Low On-Resistance
- High-Frequency Operation
- Ultra-Small Q_{gd}
- 100% UIS tested



TO-263-7

Drain	TAB
Gate	1
Kelvin Source	2
Power Source	3~7

Benefits

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

Applications

- Solar Inverters
- EV Battery Chargers
- High Voltage DC/DC Converters
- Switch Mode Power Supplies

RoHS

Halogen

Order Information

Part Number	Package	Marking
P3M06060G7	TO-263-7	P3M06060G7

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	44	A	V_{GS}= 15V T_C= 25℃
		31		V_{GS}= 15V T_C= 100℃
Power Dissipation	P_D	159	W	
Operating Junction Temperature	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	(tested after 30ms pulse at V_{GS}=15V) V_{DS}= V_{GS} I_D= 20mA T_J = 25℃
		/	1.65	/	V	V_{DS}= V_{GS} I_D= 20mA 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}	/	20	250	nA	V_{GS}= 15V V_{DS}= 0V
Drain-Source On-State Resistance	$R_{DS(on)}$	/	60	79	mΩ	V_{GS}= 15V I_D= 20A
		/	52	/		V_{GS}= 18V I_D= 20A
Trans conductance	g_{fs}	/	12	/	S	V_{DS}= 20V I_{DS}= 20A T_J = 25℃
		/	11	/		V_{DS}= 20V I_{DS}= 20A T_J= 175℃

Parameter	Symbol	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
Input Capacitance	C_{iss}	/	1911	/	pF	V_{GS}= 0V V_{DS}= 400V f= 1MHz V_{AC}= 25mV
Output Capacitance	C_{oss}	/	162	/		
Reverse Transfer Capacitance	C_{rss}	/	15.3	/		
Coss Stored Energy	E_{oss}	/	15	/	μJ	
Turn-on Energy	E_{on}	/	58.3	/	μJ	V_{DS}= 400V V_{GS}= -3/15V I_D= 20A R_G= 1Ω
Turn-off Energy	E_{off}	/	22.4	/		
Turn-On Delay Time	$t_{d(on)}$	/	12	/	nS	V_{DS}= 400V V_{GS}= -3/15V I_D= 20A R_G= 1Ω
Rise Time	t_r	/	12.5	/		
Turn-Off Delay Time	$t_{d(off)}$	/	21.9	/		
Fall Time	t_f	/	15	/		
Internal Gate Resistance	$R_{G(int)}$	/	1.06	/	Ω	f= 1MHz V_{AC}= 25mV
Gate to Source Charge	Q_{gs}	/	17.5	/	nC	V_{DS}= 400V I_{DS}= 20A V_{GS}= -3 to 15V I_G= 50mA
Gate to Drain Charge	Q_{gd}	/	15.3	/		
Total Gate Charge	Q_g	/	53.1	/		

3. Reverse Diode Characteristics

At T_J= 25℃, unless specified otherwise

Parameter	Symbol	Value		Unit	Test Conditions
		Typ.	Max.		
Diode Forward Voltage	V_{SD}	4.8	/	V	V_{GS}= -3V I_{SD}= 10A T_J= 25℃
		4.3	/	V	V_{GS}= -3V I_{SD}= 10A T_J= 175℃
Continuous Diode Forward Current	I_S	25	/	A	V_{GS}= -3V
Reverse Recover Time	t_{rr}	15.2	/	nS	V_{GS}= -3V I_{SD}= 20A V_R= 400V d_{if}/d_t= 4200A/μs T_J= 25℃
Reverse Recovery Charge	Q_{rr}	430.6	/	nC	
Peak Reverse Recovery Current	I_{rrm}	45.1	/	A	

4. Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction to Case	$R_{\theta JC}$	0.94	℃/W

5. Typical Performance

At T_J= 25℃, unless specified otherwise

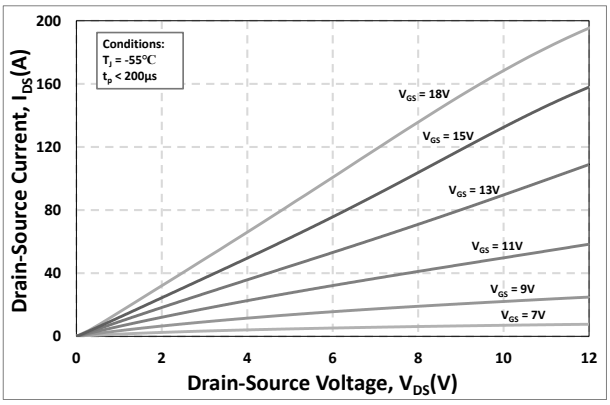


Figure 1. Output Characteristics T_J = -55℃

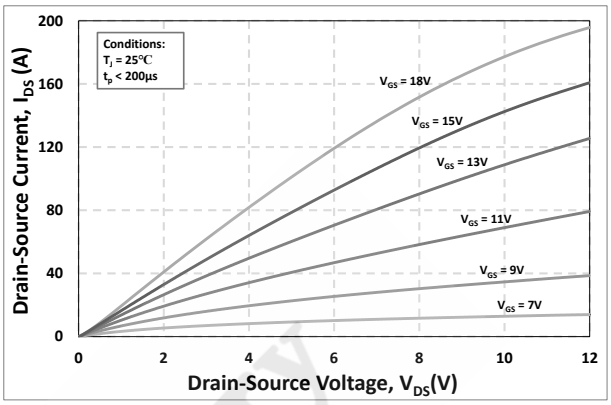


Figure 2. Output Characteristics T_J = 25℃

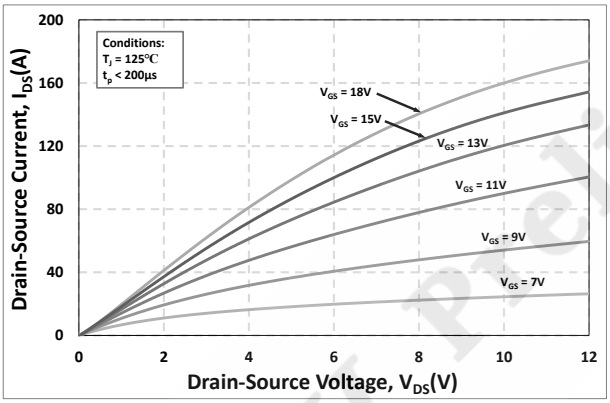


Figure 3. Output Characteristics T_J = 125℃

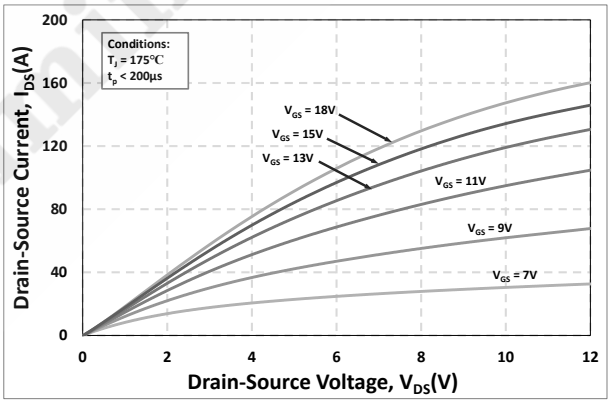


Figure 4. Output Characteristics T_J = 175℃

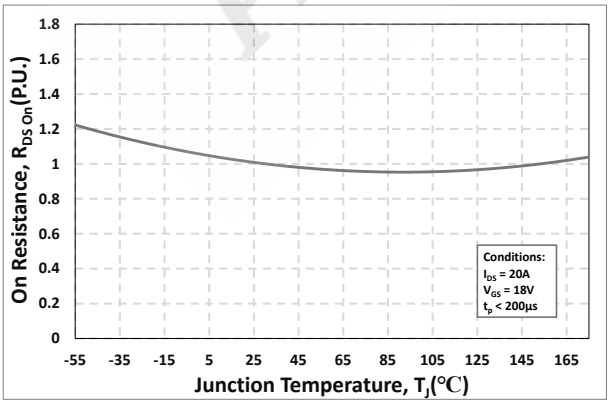


Figure 5. Normalized On-Resistance vs. Temperature

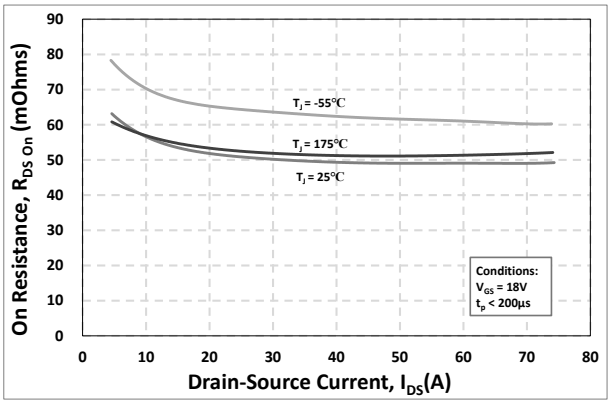


Figure 6. On-Resistance vs. Drain Current Various Temperatures

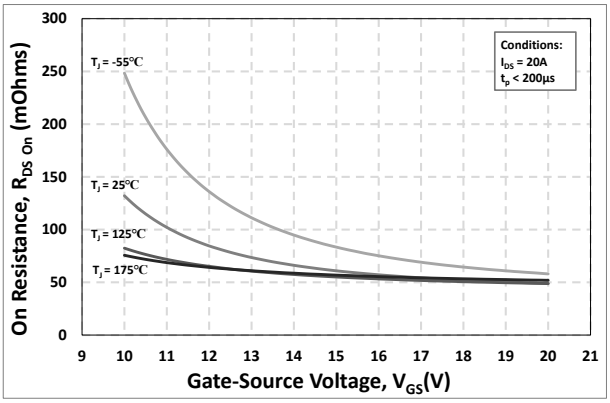


Figure 7. On-Resistance vs. Gate-Source Voltage

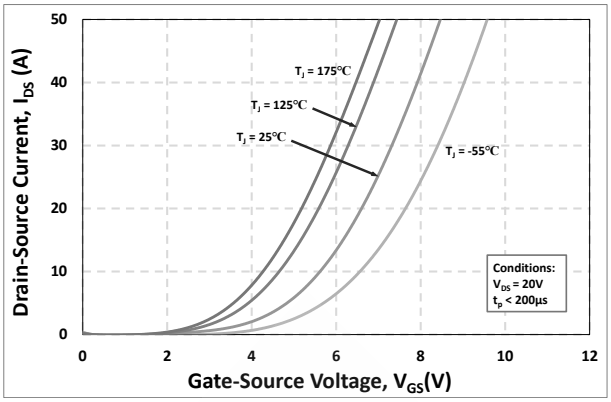


Figure 8. Transfer Characteristic for Various Junction Temperatures

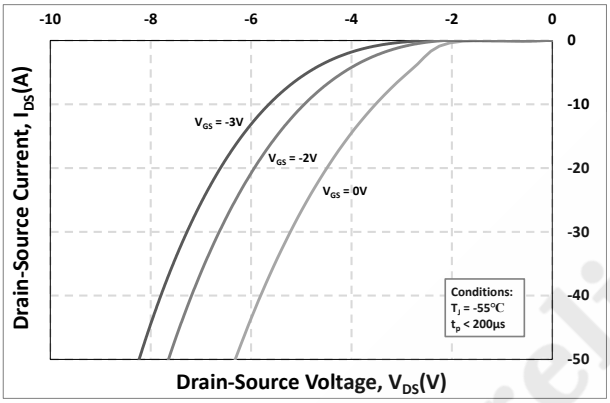


Figure 9. Body Diode Characteristic at -55°C

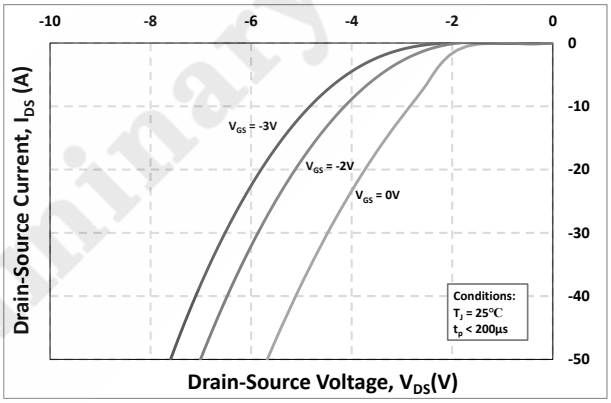


Figure 10. Body Diode Characteristic at 25°C

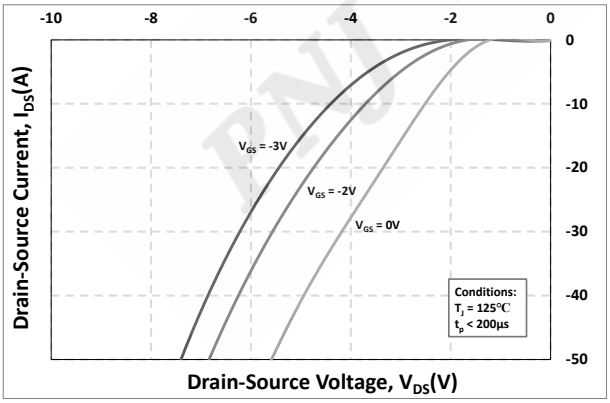


Figure 11. Body Diode Characteristic at 125°C

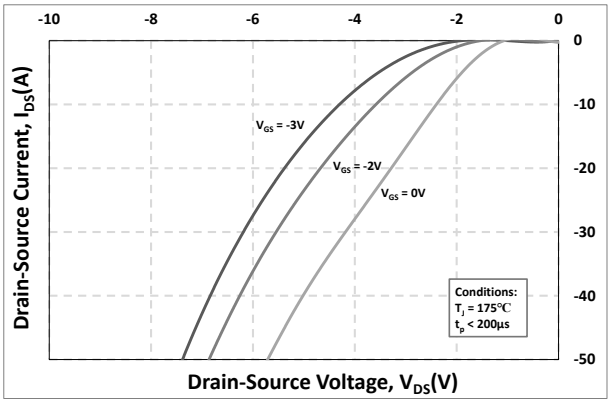


Figure 12. Body Diode Characteristic at 175°C

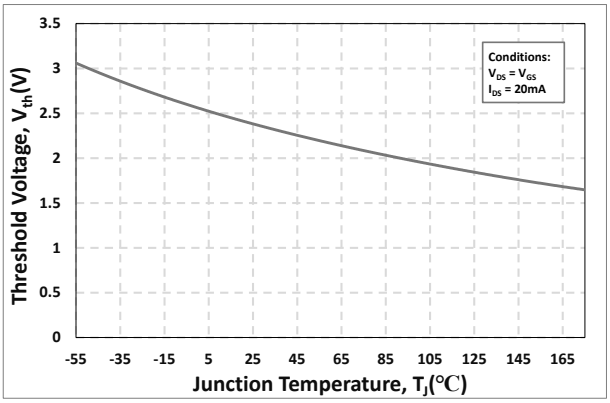


Figure 13. Threshold Voltage vs. Temperature

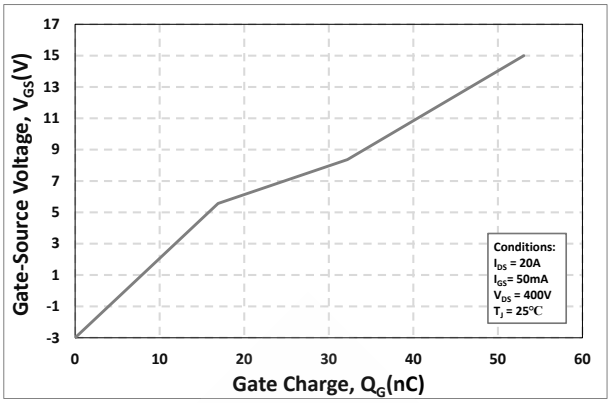


Figure 14. Gate Charge Characteristics

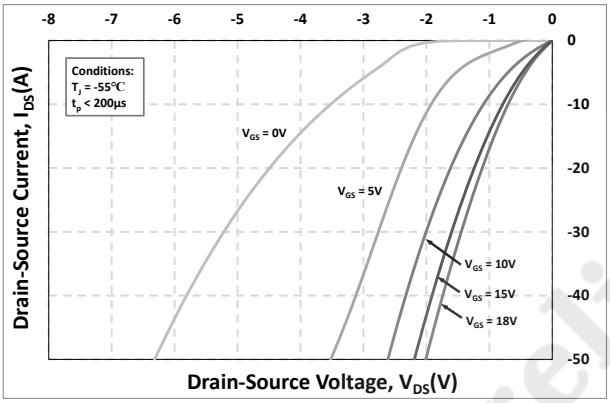


Figure 15. 3rd Quadrant Characteristic at -55℃

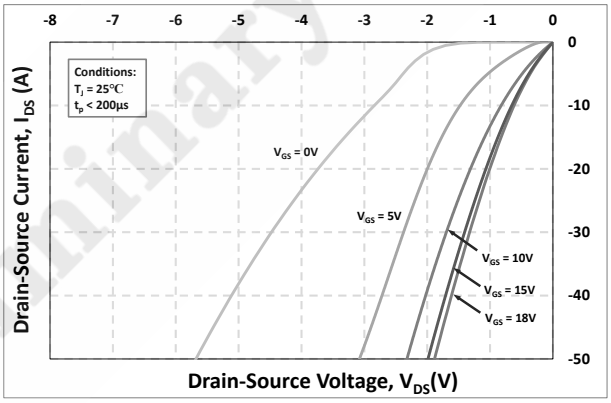


Figure 16. 3rd Quadrant Characteristic at 25°C

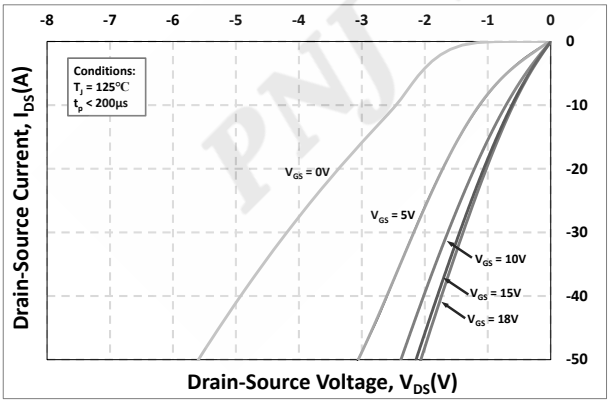


Figure 17. 3rd Quadrant Characteristic at 125℃

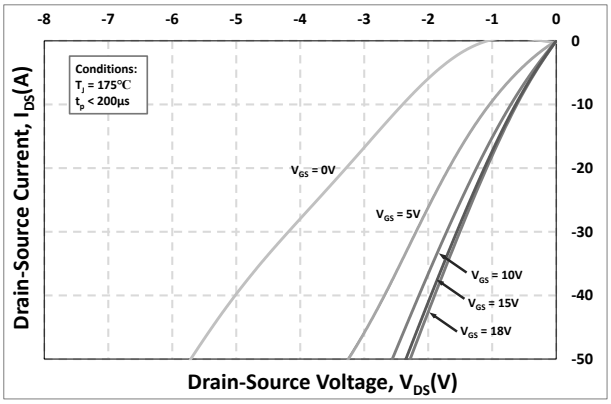


Figure 18. 3rd Quadrant Characteristic at 175℃

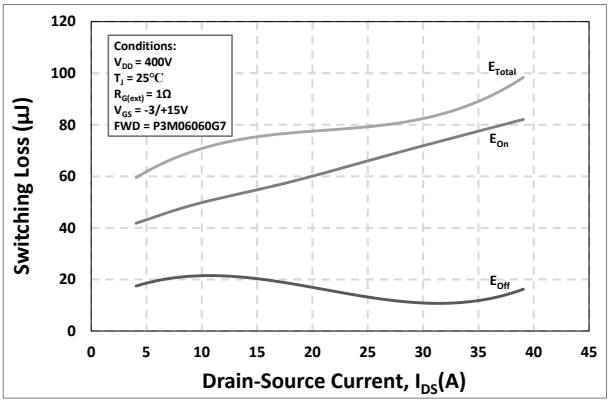


Figure 19. Clamped Inductive Switching Energy vs. Drain Current (V_{DD}= 400V)

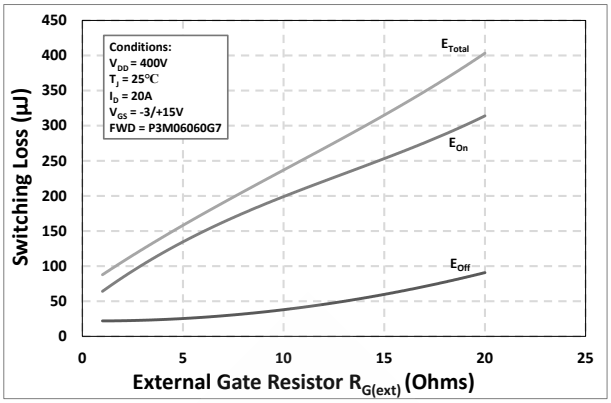


Figure 20. Clamped Inductive Switching Energy vs. $R_{G(ext)}$

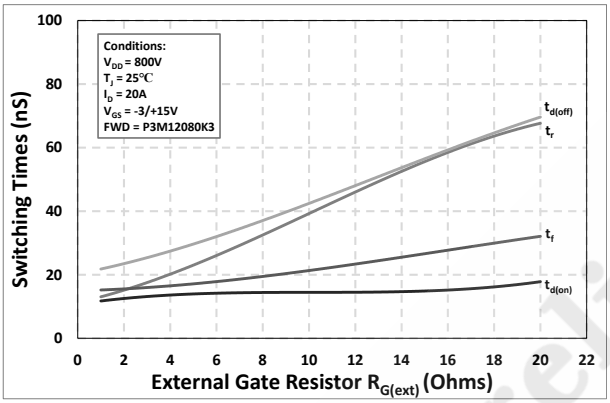


Figure 21. Switching Times vs. $R_{G(ext)}$

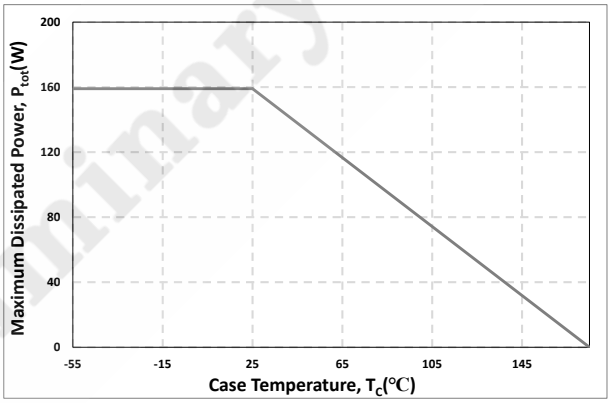


Figure 22. Maximum Power Dissipation Derating vs. Case Temperature

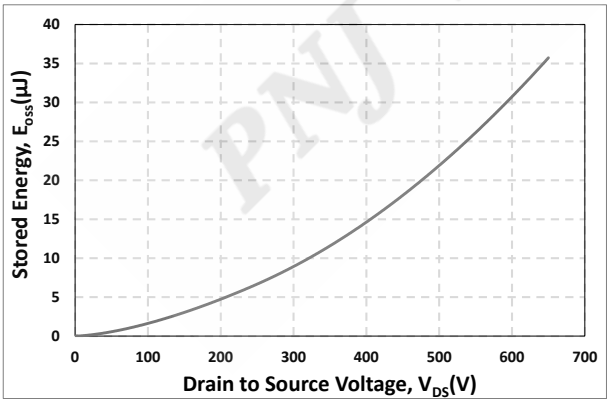


Figure 23. Output Capacitor Stored Energy

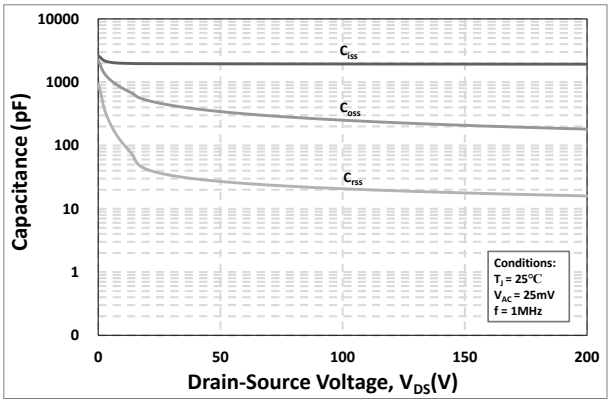


Figure 24. Capacitances vs. Drain-Source Voltage (0 - 200V)

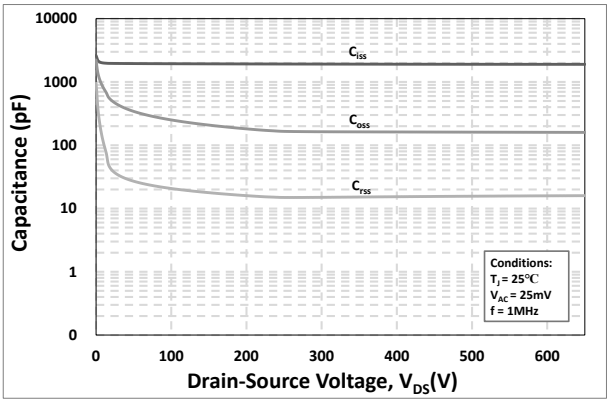


Figure 25. Capacitances vs. Drain-Source Voltage (0 - 650V)

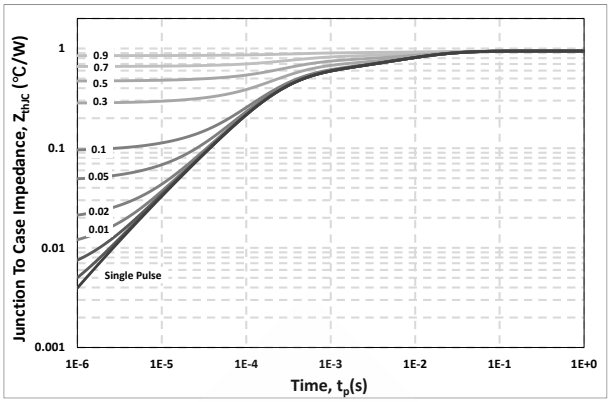


Figure 26. Transient Thermal Impedance (Junction - Case)

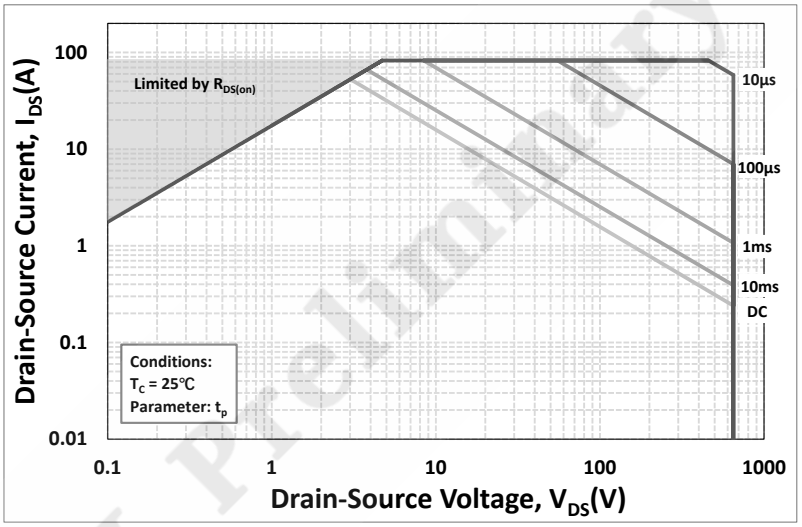


Figure 27. Safe Operating Area

6. Definitions

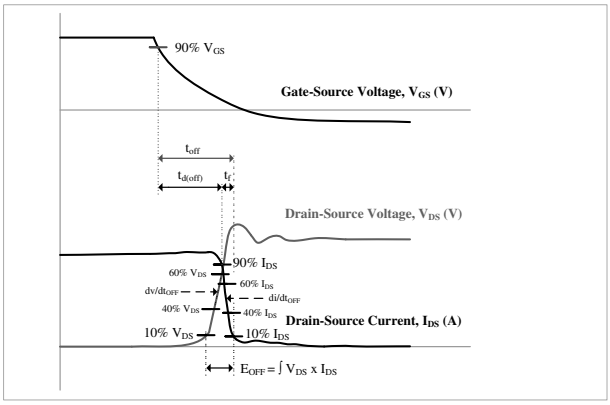


Figure 28. Turn-off Transient Definitions

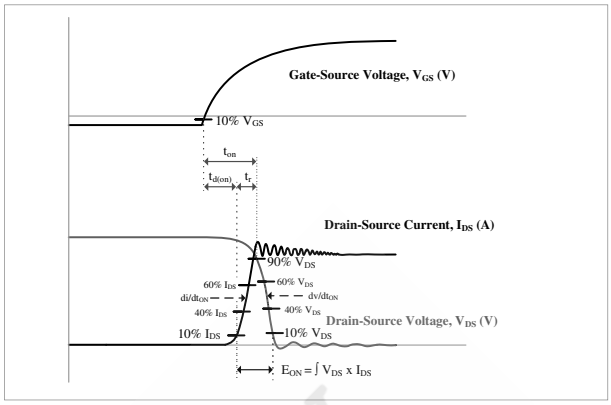


Figure 29. Turn-on Transient Definitions

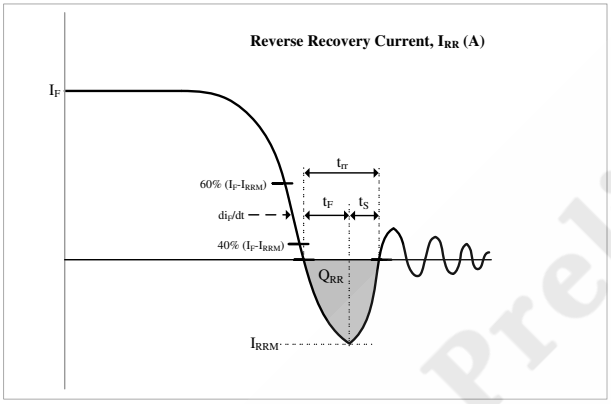


Figure 30. Reverse Recovery Definitions

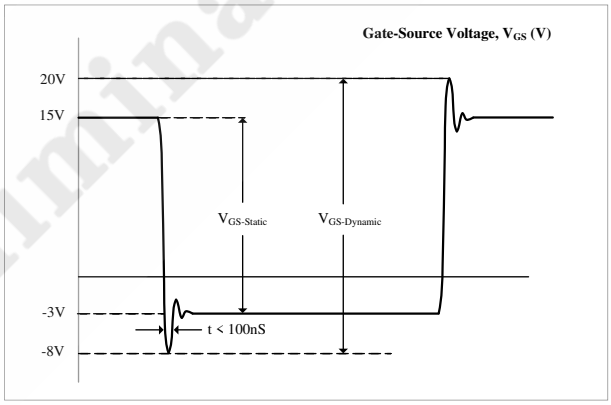
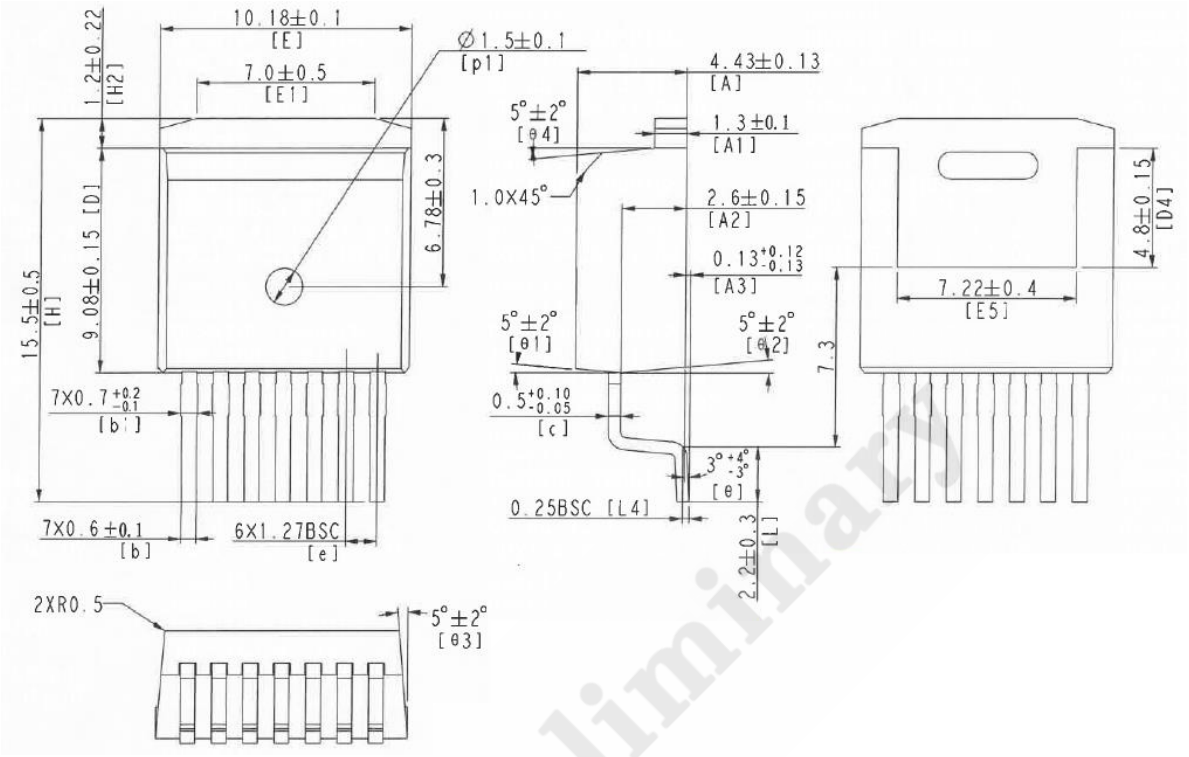


Figure 31. Vgs Transient Definitions

7. Package Outlines



Drawing and Dimensions

Important Notice

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, PN Junction hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

PN Junction reserves the right to make changes at any time to any products or information herein, without notice. “Typical” parameters which may be provided in PN Junction data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including “Typical” must be validated for each customer application by customer’s technical experts.

In addition, any information given in this document is subject to customer’s compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer’s products and any use of the product of PN Junction in customer’s applications. The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer’s technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

For further information on the product, technology, delivery terms and conditions and prices please contact your nearest PN Junction office (www.pnjsemi.com).

Warnings

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest PN Junction office.

Except as otherwise explicitly approved by PN Junction in a written document signed by authorized representatives of PN Junction, PN Junction’s products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.