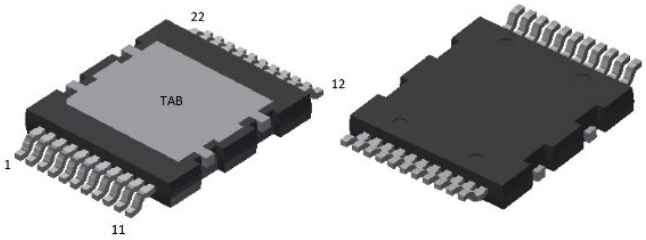
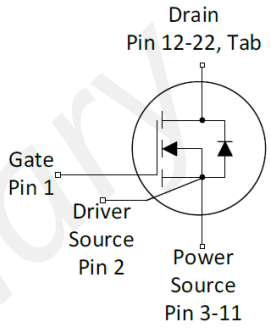
SiC MOS P3M07015PQ
N-Channel Enhancement Mode



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

PQPAK-LF-22

Gate	1
Kelvin Source	2
Power Source	3-11
Drain	TAB (12-22)

Applications

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

RoHS

Halogen

Order Information

Part Number	Package	Marking
P3M07015PQ	PQPAK-LF-22	P3M07015PQ

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PNJ Preliminary

1. Maximum Ratings

At T_J= 25℃, unless specified otherwise

Parameter	Symbol	Value	Unit	Test Conditions
Drain - Source Voltage	V_{DSmax}	750	V	V_{GS}= 0V I_D= 100μA
Gate - Source Voltage (dynamic)	V_{GSmax}	-8 / +22	V	AC (f>1 Hz)
		-10 / +25		tp≤20ns, dutycycle≤1%
Gate - Source Voltage(static) turn-on gate voltage turn-off gate voltage	$V_{GS,on}$ $V_{GS,off}$	+15 / +18 -3	V	Static
Continuous Drain Current	I_D	122	A	V_{GS}= 18V T_C= 25℃
		86		V_{GS}= 18V T_C= 100℃
Pulsed Drain Current	$I_{D(pulse)}$	320	A	PW≤ 10us， Duty cycle ≤ 1%
Power Dissipation	P_D	500	W	
Operating Junction	T_J	-55 To +150	℃	
Storage Temperature	T_{stg}	-55 To +175	℃	
Solder Temperature	T_L	245	℃	

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2. Electrical Characteristics

At T_J= 25℃, unless specified otherwise

Parameter	Symbol	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	750	/	/	V	V_{GS}= 0V I_D= 2.5mA
Gate Threshold Voltage	$V_{GS(th)}$	2.0	2.7	/	V	(tested after 30ms pulse at V_{GS}=18V) V_{DS}= V_{GS} I_D= 15mA T_J = 25℃
		/	1.9	/	V	V_{DS}= V_{GS} I_D= 15mA T_J = 175℃
Reverse Bias Drain Current	I_{DSS}	/	1	100	μA	V_{GS}= 0V V_{DS}= 750V
Gate-Source Leakage Current	I_{GSS}	/	3	100	nA	V_{GS}= 18V V_{DS}= 0V
Drain-Source On-State Resistance	$R_{DS(on)}$	/	15	24	mΩ	V_{GS}= 18V I_D= 56A T_J = 25℃
		/	19	/		V_{GS}= 18V I_D= 56A T_J = 175℃
Trans conductance	g_{fs}	/	39	/	S	V_{DS}= 20V I_{DS}= 56A T_J = 25℃
		/	36	/		V_{DS}= 20V I_{DS}= 56A T_J= 175℃

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Parameter	Symbol	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
Input Capacitance	C_{iss}	/	6415	/	pF	V_{GS}= 0V V_{DS}= 500V f= 500kHz V_{AC}= 25mV
Output Capacitance	C_{oss}	/	430	/		
Reverse Transfer Capacitance	C_{rss}	/	35	/		
Coss Stored Energy	E_{oss}	/	62	/	μJ	
Turn-on Energy	E_{on}	/	421	/	μJ	V_{DS}= 500V V_{GS}= -3/18V I_D= 56A R_G= 1Ω
Turn-off Energy	E_{off}	/	162	/		
Turn-On Delay Time	$t_{d(on)}$	/	22	/		V_{DS}= 500V V_{GS}= -3/18V I_D= 56A R_G= 1Ω
Rise Time	t_r	/	31	/		
Turn-Off Delay Time	$t_{d(off)}$	/	61	/		
Fall Time	t_f	/	16.8	/		
Internal Gate Resistance	$R_{G(int)}$	/	2.1	/	Ω	f= 1MHz V_{AC}= 25mV
Gate to Source Charge	Q_{gs}	/	87	/	nC	V_{DS}= 500V I_{DS}= 56A V_{GS}= -3/18V I_G= 20mA
Gate to Drain Charge	Q_{gd}	/	53	/		
Total Gate Charge	Q_g	/	221	/		

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3. Reverse Diode Characteristics

At T_J= 25℃, unless specified otherwise

Parameter	Symbol	Value		Unit	Test Conditions
		Typ.	Max.		
Diode Forward Voltage	V_{SD}	5.2	/	V	V_{GS}= -3V I_{SD}= 28A T_J = 25℃
		4.6	/	V	V_{GS}= -3V I_{SD}= 28A T_J= 175℃
Continuous Diode Forward Current	I_S	68	/	A	V_{GS}= -3V
Reverse Recover Time	t_{rr}	21	/	ns	V_{GS}= -3/18V I_{SD}= 56A V_R= 500V d_{if}/d_t= 4200A/μs T_J= 25℃
Reverse Recovery Charge	Q_{rr}	749	/	nC	
Peak Reverse Recovery Current	I_{rrm}	56	/	A	

4. Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction to Case	$R_{\theta JC}$	0.3	℃/W

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5. Typical Performance

At T_J= 25℃, unless specified otherwise

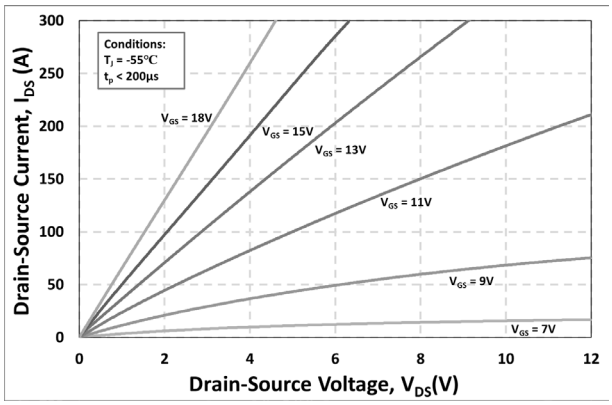

Figure 1. Output Characteristics T_J = -55℃

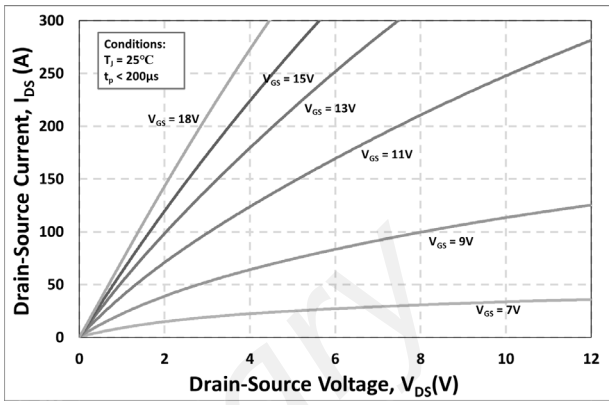

Figure 2. Output Characteristics T_J = 25℃

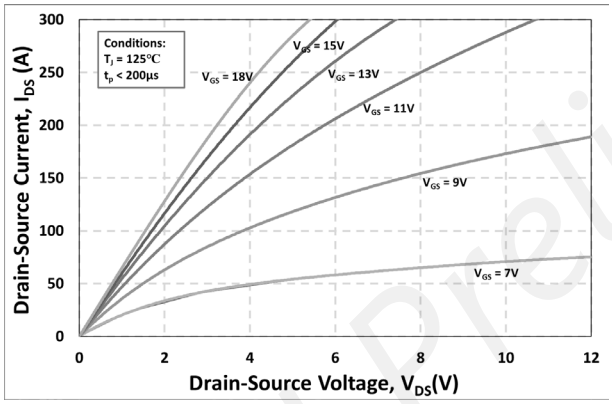

Figure 3. Output Characteristics T_J = 125℃

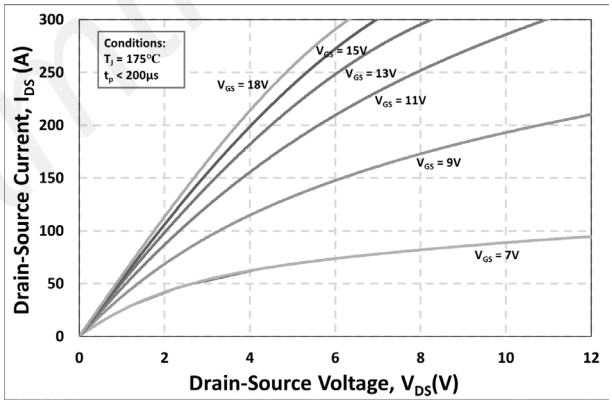

Figure 4. Output Characteristics T_J = 175℃

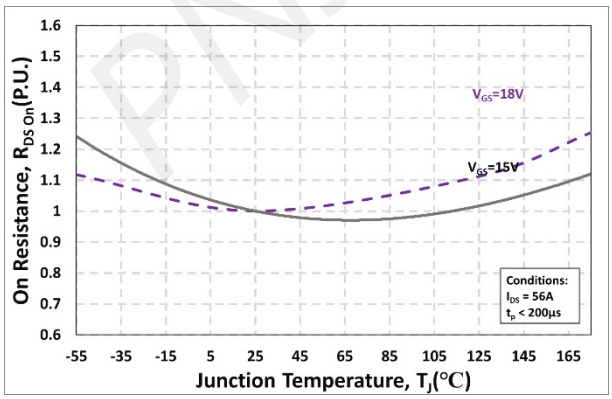

Figure 5. Normalized On-Resistance vs. Temperature

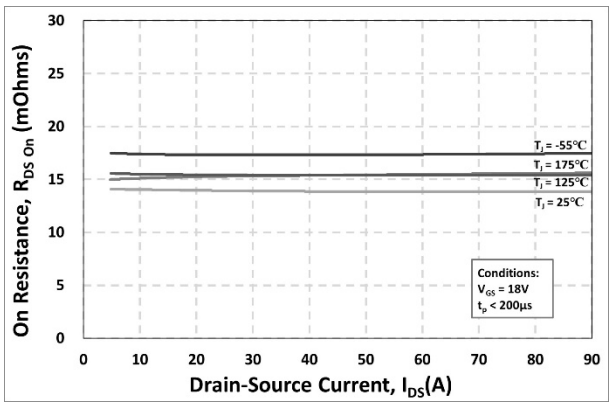

Figure 6. On-Resistance vs. Drain Current Various Temperatures

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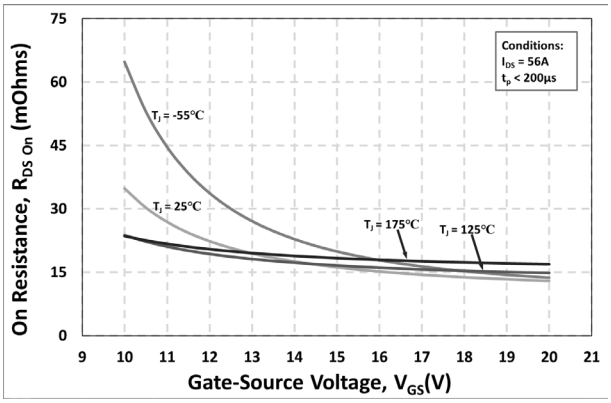

Figure 7. On-Resistance vs. Gate-Source Voltage

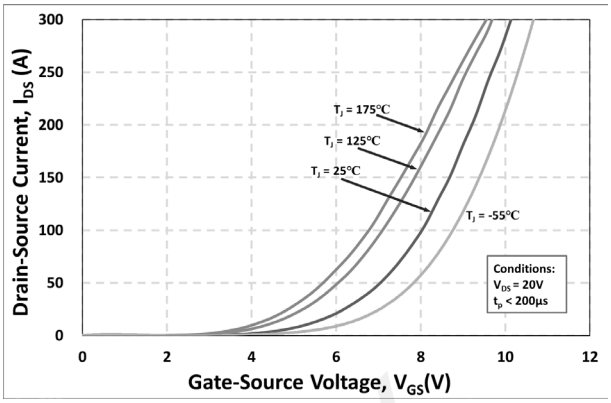

Figure 8. Transfer Characteristic for Various Junction Temperatures

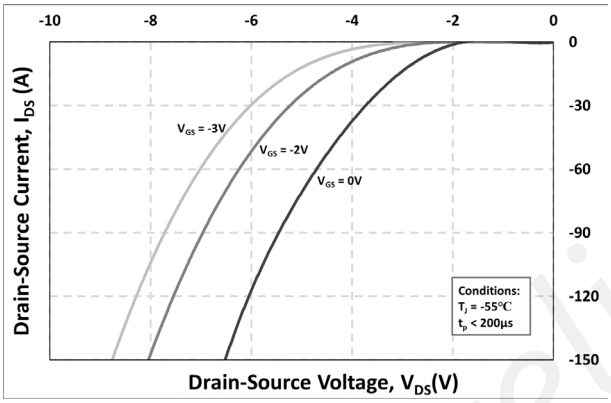

Figure 9. Body Diode Characteristic at -55°C

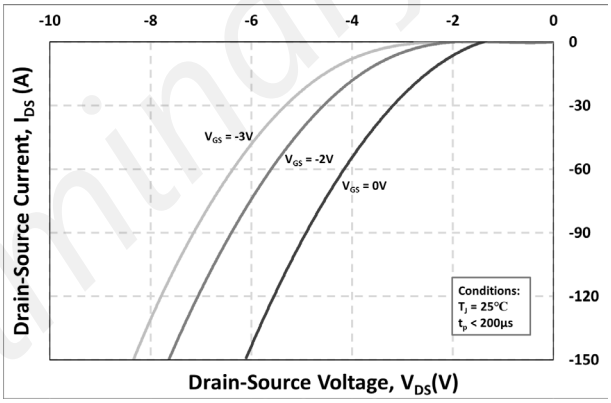

Figure 10. Body Diode Characteristic at 25°C

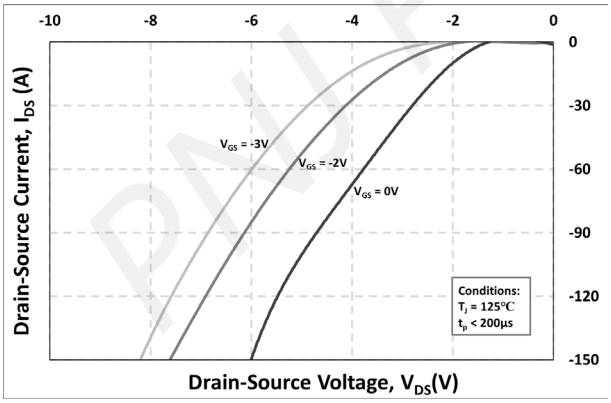

Figure 11. Body Diode Characteristic at 125°C

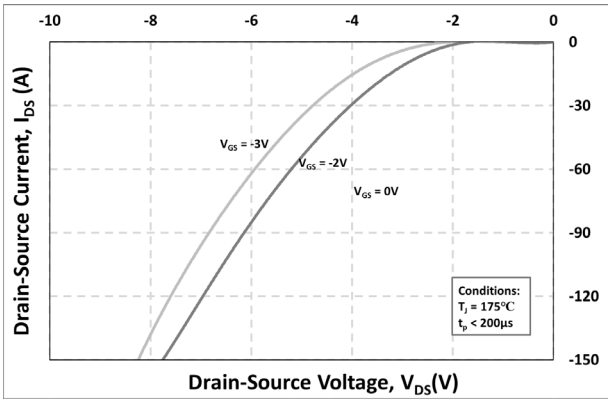

Figure 12. Body Diode Characteristic at 175°C

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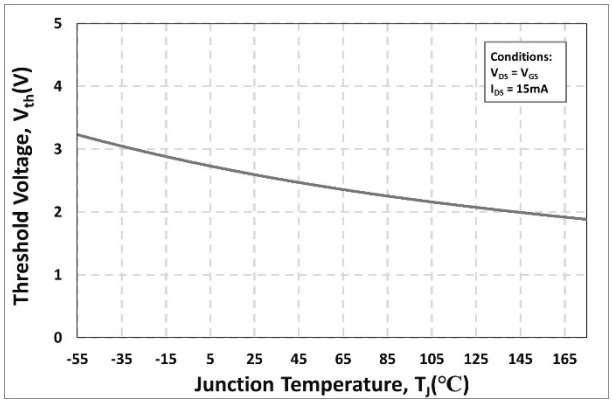

Figure 13. Threshold Voltage vs. Temperature

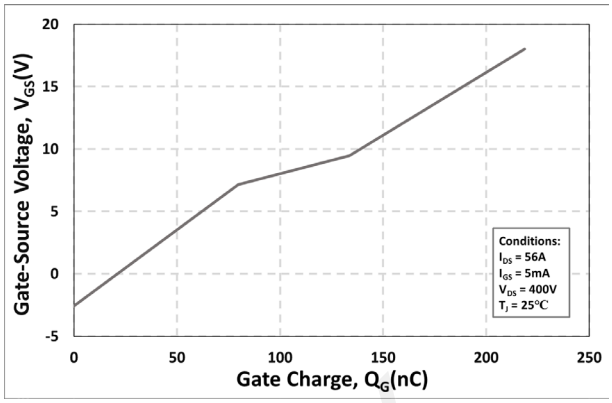

Figure 14. Gat Charge Characteristics

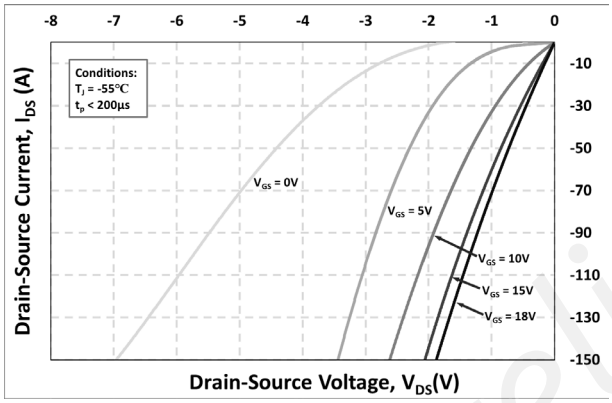

Figure 15. 3rd Quadrant Characteristic at -55°C

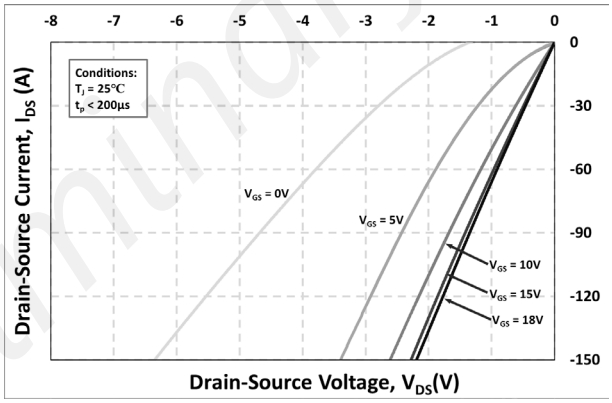

Figure 16. 3rd Quadrant Characteristic at 25°C

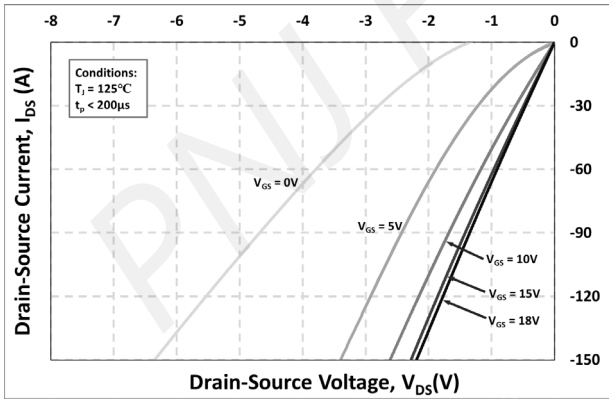

Figure 17. 3rd Quadrant Characteristic at 125°C

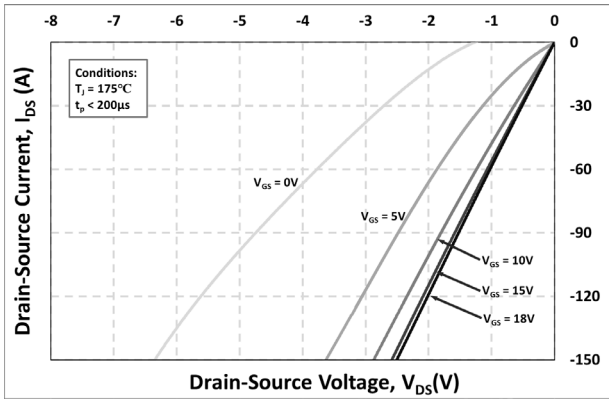

Figure 18. 3rd Quadrant Characteristic at 175°C

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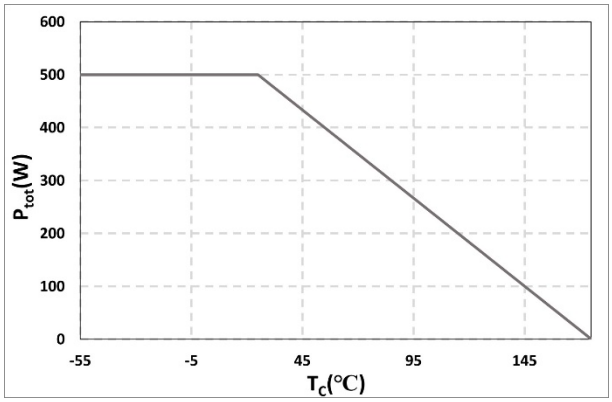

Figure 19. Maximum Power Dissipation Derating vs. Case Temperature

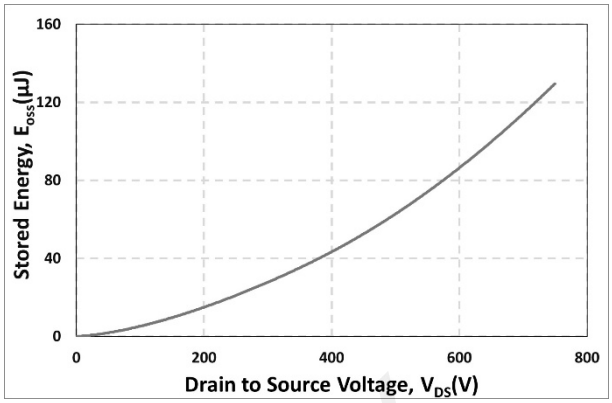

Figure 20. Output Capacitor Stored Energy

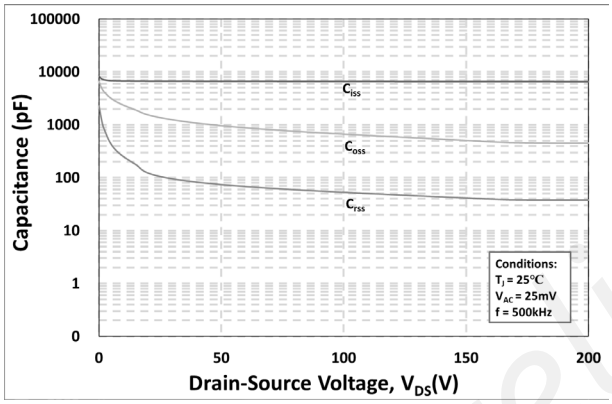

Figure 21. Capacitances vs. Drain-Source Voltage (0 - 200V)

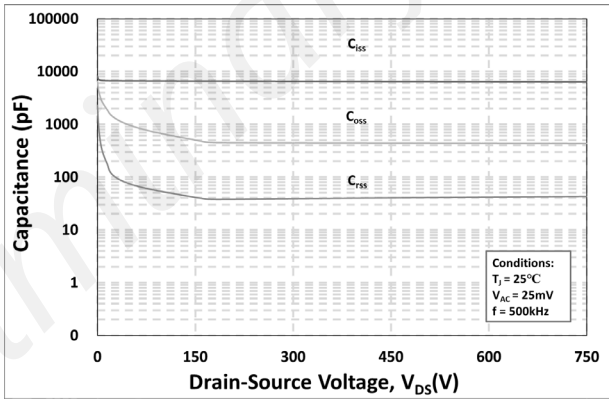

Figure 22. Capacitances vs. Drain-Source Voltage (0 - 750V)

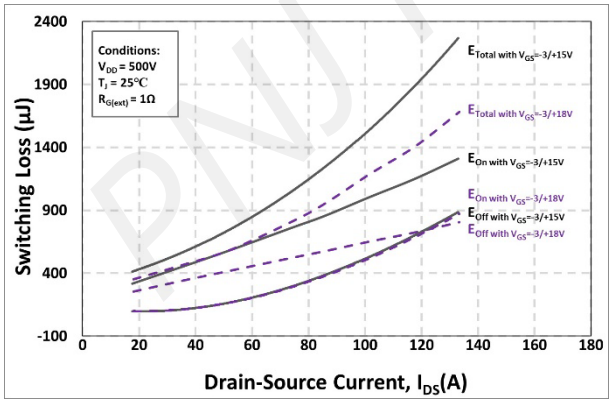

Figure 23. Clamped Inductive Switching Energy vs. Drain Current (VDD= 400V)

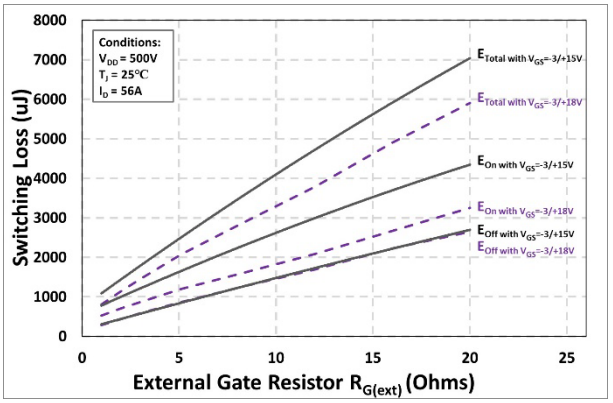

Figure 24. Clamped Inductive Switching Energy vs. RG(ext)

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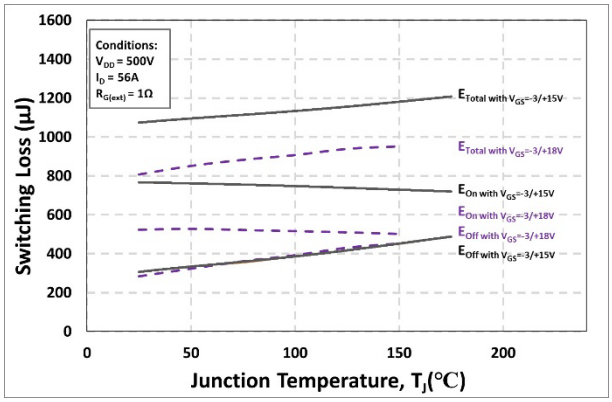

Figure 25. Clamped Inductive Switching Energy vs. Temperature

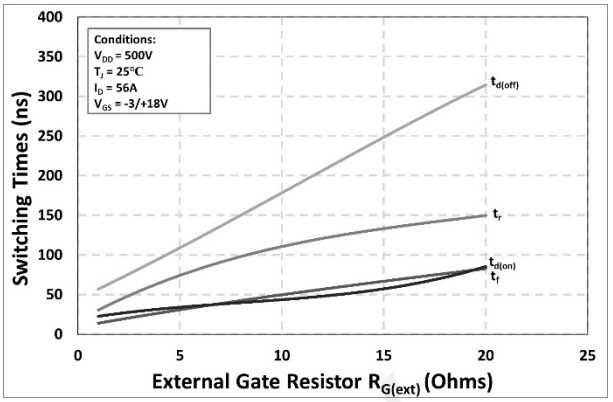

Figure 26. Switching Times vs. RG(ext)

6. Definitions

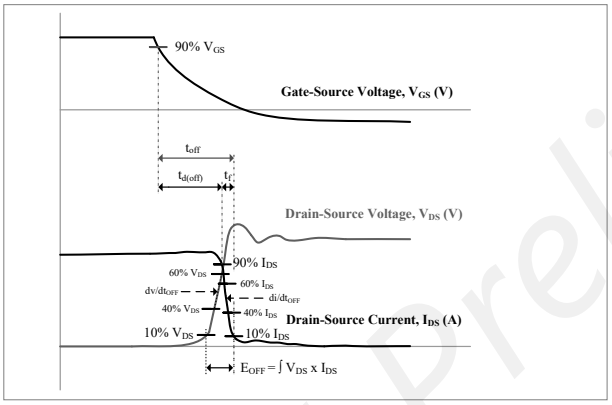

Figure 27. Turn-off Transient Definitions

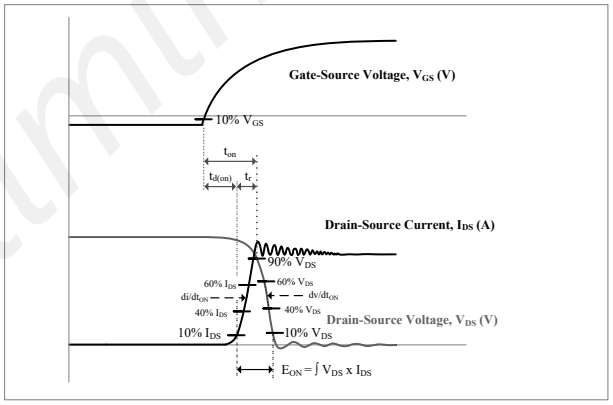

Figure 28. Turn-on Transient Definitions

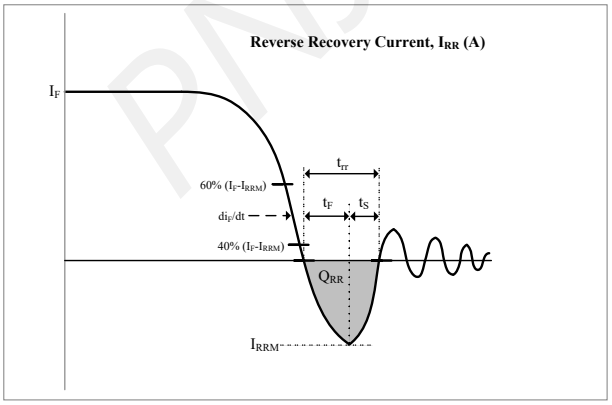

Figure 29. Reverse Recovery Definitions

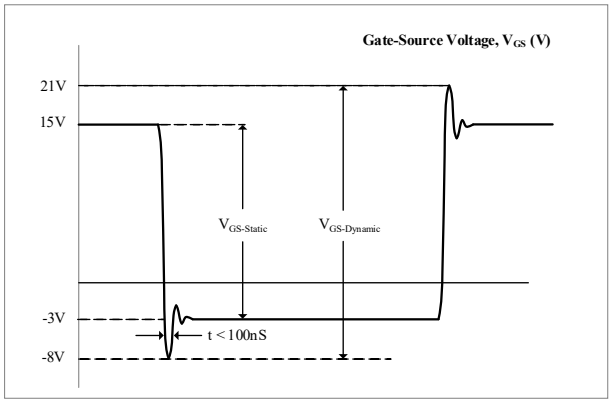

Figure 30. V_{GS} Transient Definitions

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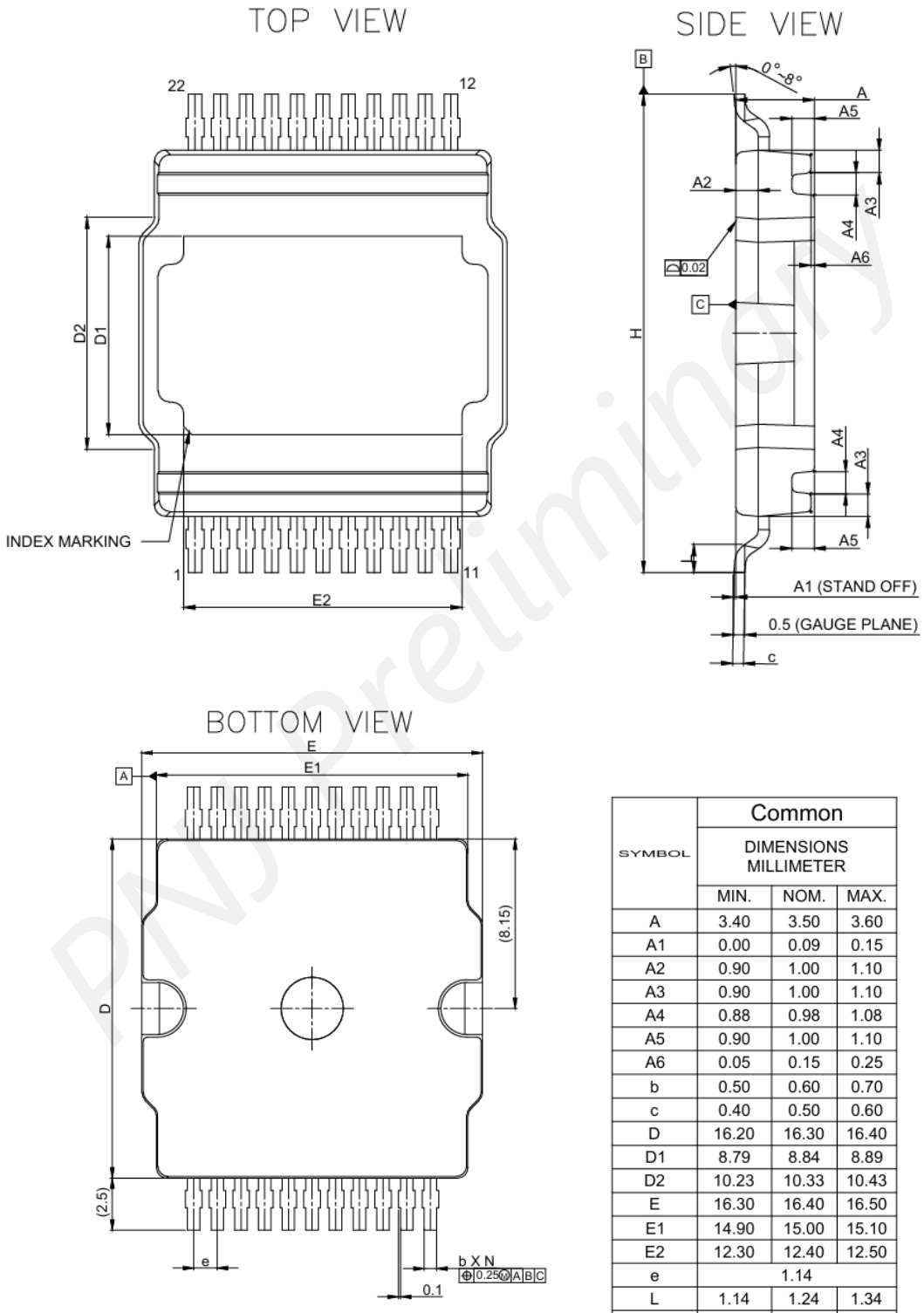
7. Package Outlines



SYMBOL	Common		
	DIMENSIONS MILLIMETER		
	MIN.	NOM.	MAX.
A	3.40	3.50	3.60
A1	0.00	0.09	0.15
A2	0.90	1.00	1.10
A3	0.90	1.00	1.10
A4	0.88	0.98	1.08
A5	0.90	1.00	1.10
A6	0.05	0.15	0.25
b	0.50	0.60	0.70
c	0.40	0.50	0.60
D	16.20	16.30	16.40
D1	8.79	8.84	8.89
D2	10.23	10.33	10.43
E	16.30	16.40	16.50
E1	14.90	15.00	15.10
E2	12.30	12.40	12.50
e	1.14		
L	1.14	1.24	1.34
H	21.20	21.30	21.40
N	22		

Drawing and Dimensions

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

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Warnings

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

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