



P3M06060L8 SiC MOS N-Channel Enhancement Mode

V_{RRM} = 650 V
 I_D = 37 A
 $I_D(100^\circ\text{C})$ = 24 A
 $R_{DS(on)}$ = 60 m Ω

SiC MOS P3M06060L8 N-Channel Enhancement Mode

Features

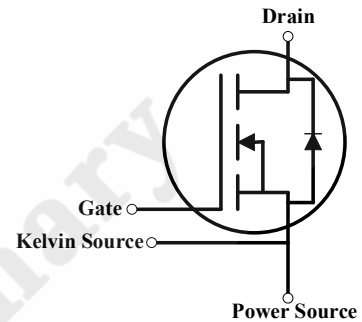
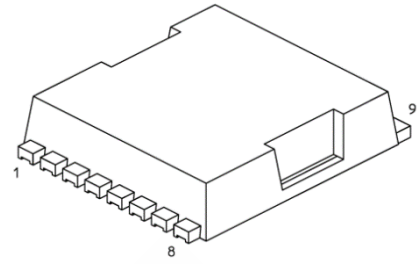
- High Blocking Voltage with Low On-Resistance
- High-Frequency Operation
- Ultra-Small Q_{gd}
- 100% UIS tested

Benefits

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

Applications

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



TOLL

Gate	1
Kelvin Source	2
Power Source	3~8
Drain	9



Order Information

Part Number	Package	Marking
P3M06060L8	TOLL	P3M06060L8



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PNJ Preliminary



1. Maximum Ratings

At $T_J = 25^\circ\text{C}$, unless specified otherwise

Parameter	Symbol	Value	Unit	Test Conditions
Drain - Source Voltage	V_{DSmax}	650	V	$V_{GS} = 0V$ $I_D = 100\mu A$
Gate - Source Voltage (dynamic)	V_{GSmax}	-8 / +20	V	AC ($f > 1\text{ Hz}$)
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	37	A	$V_{GS} = 15V$ $T_C = 25^\circ\text{C}$
		24		$V_{GS} = 15V$ $T_C = 100^\circ\text{C}$
Power Dissipation	P_D	156	W	
Operating Junction	T_J	-55 To +150	$^\circ\text{C}$	
Storage Temperature	T_{stg}	-55 To +150	$^\circ\text{C}$	
Solder Temperature	T_L	260	$^\circ\text{C}$	



2. Electrical Characteristics

At $T_J = 25^\circ\text{C}$, unless specified otherwise

Parameter	Symbol	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	650	/	/	V	$V_{GS} = 0V$ $I_D = 100\mu A$
Gate Threshold Voltage	$V_{GS(th)}$	1.8	2.4	/	V	(tested after 30ms pulse at $V_{GS} = 15V$ $V_{DS} = V_{GS}$ $I_D = 5mA$ $T_J = 25^\circ\text{C}$
		/	1.8	/	V	$V_{DS} = V_{GS}$ $I_D = 5mA$ $T_J = 150^\circ\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	/	1	100	μA	$V_{GS} = 0V$ $V_{DS} = 650V$
Gate-Source Leakage Current	I_{GSS}	/	20	250	nA	$V_{GS} = 15V$ $V_{DS} = 0V$
Drain-Source On-State Resistance	$R_{DS(on)}$	/	60	78	m Ω	$V_{GS} = 15V$ $I_D = 20A$ $T_J = 25^\circ\text{C}$
		/	52	/		$V_{GS} = 18V$ $I_D = 20A$ $T_J = 25^\circ\text{C}$
Trans conductance	g_{fs}	/	12	/	S	$V_{DS} = 20V$ $I_{DS} = 20A$ $T_J = 25^\circ\text{C}$
		/	11	/		$V_{DS} = 20V$ $I_{DS} = 20A$ $T_J = 150^\circ\text{C}$



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Parameter	Symbol	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
Input Capacitance	C_{iss}	/	1853	/	pF	$V_{GS} = 0V$ $V_{DS} = 400V$ $f = 1MHz$ $V_{AC} = 25mV$
Output Capacitance	C_{oss}	/	139	/		
Reverse Transfer Capacitance	C_{rss}	/	8.3	/		
Coss Stored Energy	E_{oss}	/	13.6	/	μJ	
Internal Gate Resistance	$R_{G(int)}$	/	1.2	/	Ω	$f = 1MHz$ $V_{AC} = 25mV$
Gate to Source Charge	Q_{gs}	/	17.5	/	nC	$V_{DS} = 400V$ $I_{DS} = 20A$ $V_{GS} = -3 \text{ to } 15V$ $I_G = 50mA$
Gate to Drain Charge	Q_{gd}	/	15.3	/		
Total Gate Charge	Q_g	/	53.1	/		

3. Reverse Diode Characteristics

At $T_J = 25^\circ C$, unless specified otherwise

Parameter	Symbol	Value		Unit	Test Conditions
		Typ.	Max.		
Diode Forward Voltage	V_{SD}	5.7	/	V	$V_{GS} = -3V$ $I_{SD} = 10A$ $T_J = 25^\circ C$
		5.1	/	V	$V_{GS} = -3V$ $I_{SD} = 10A$ $T_J = 150^\circ C$
Continuous Diode Forward Current	I_S	24	/	A	$V_{GS} = -3V$



4. Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction to Case	$R_{\theta JC}$	0.8	$^{\circ}\text{C}/\text{W}$

5. Typical Performance

At $T_J = 25^{\circ}\text{C}$, unless specified otherwise

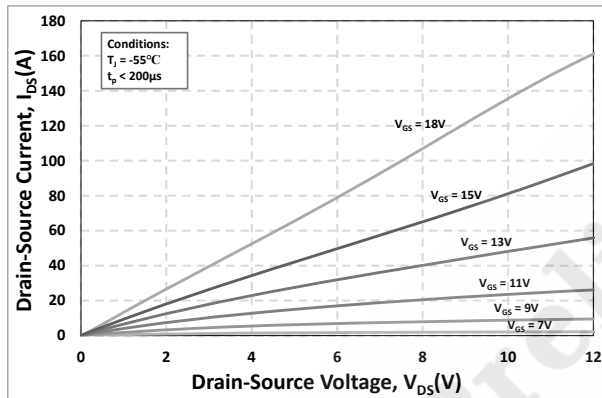


Figure 1. Output Characteristics $T_J = -55^{\circ}\text{C}$

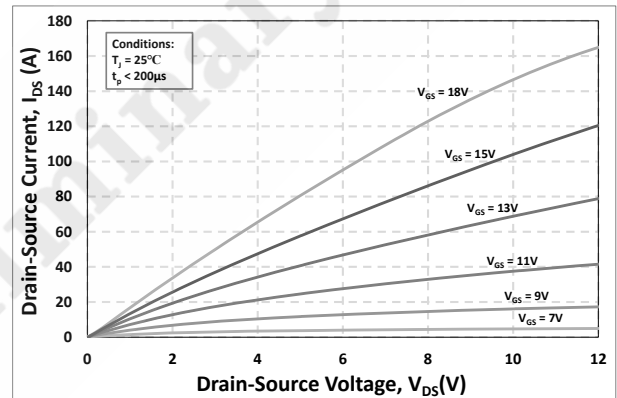


Figure 2. Output Characteristics $T_J = 25^{\circ}\text{C}$

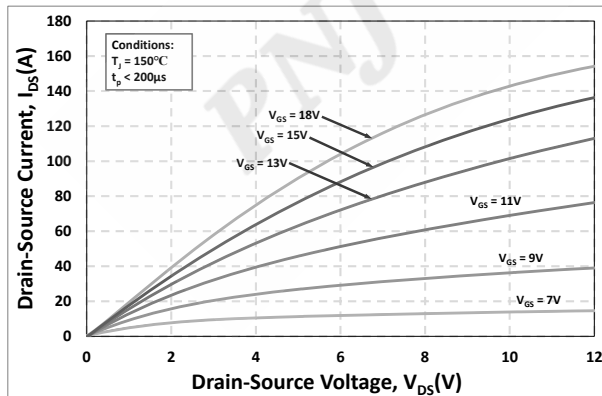


Figure 3. Output Characteristics $T_J = 150^{\circ}\text{C}$

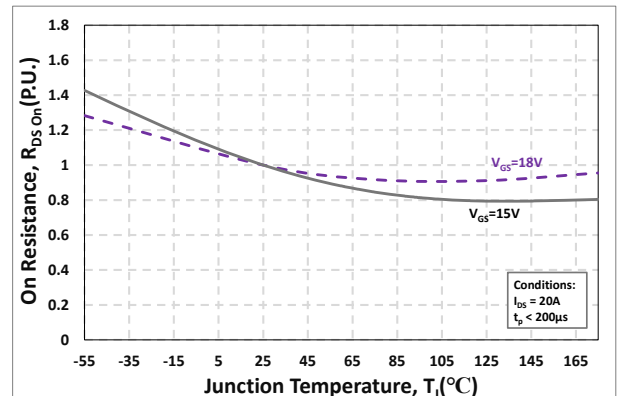


Figure 4. Normalized On-Resistance vs. Temperature

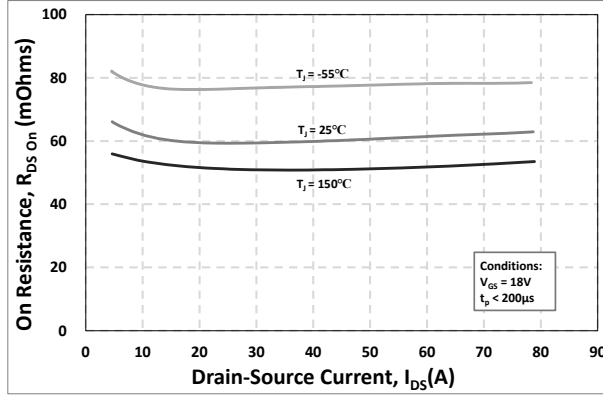


Figure 5. On-Resistance vs. Drain Current Various Temperatures

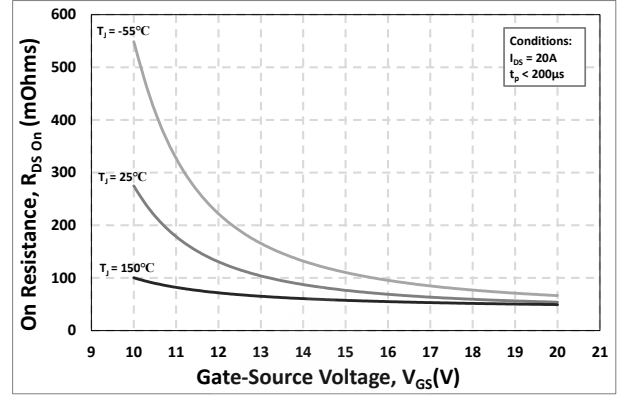


Figure 6. On-Resistance vs. Gate-Source Voltage

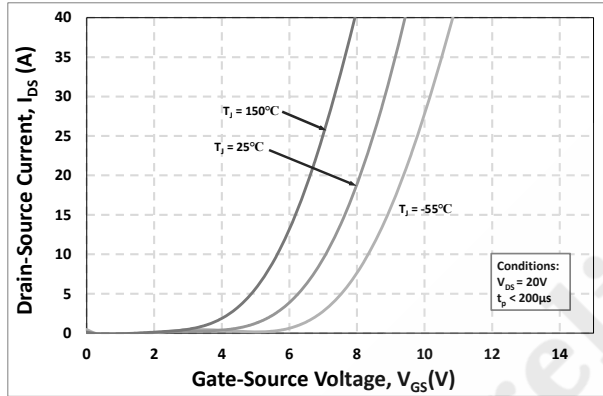


Figure 7. Transfer Characteristic for Various Junction Temperatures

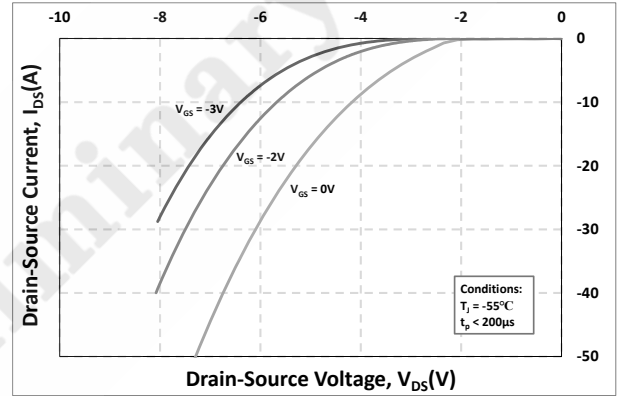


Figure 8. Body Diode Characteristic at -55°C

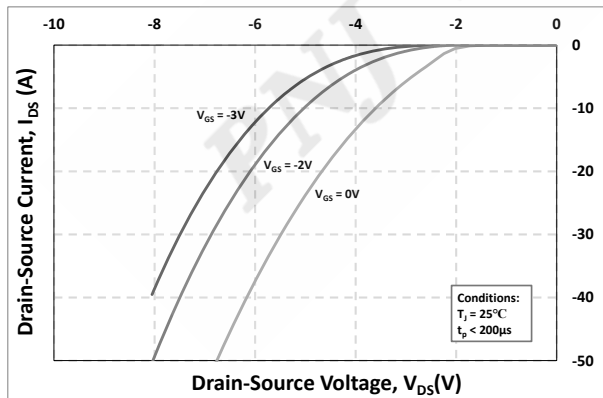


Figure 9. Body Diode Characteristic at 25°C

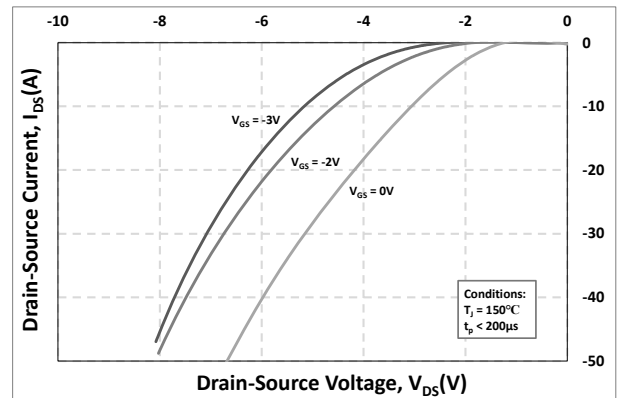


Figure 10. Body Diode Characteristic at 150°C

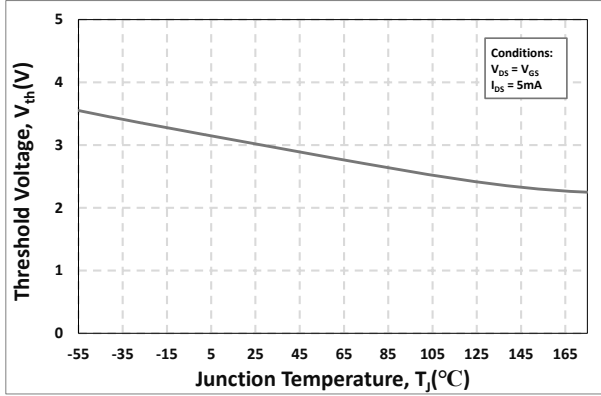


Figure 11. Threshold Voltage vs. Temperature

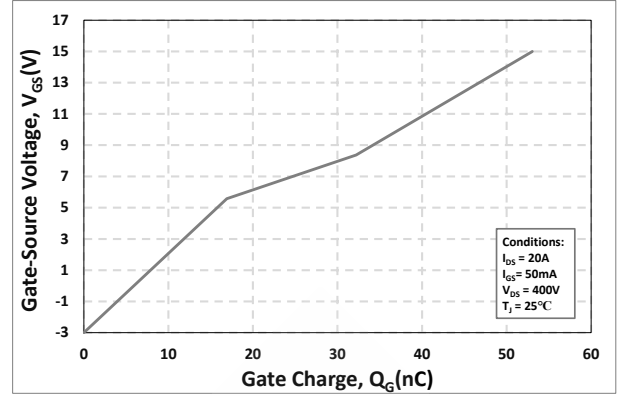


Figure 12. Gate Charge Characteristics

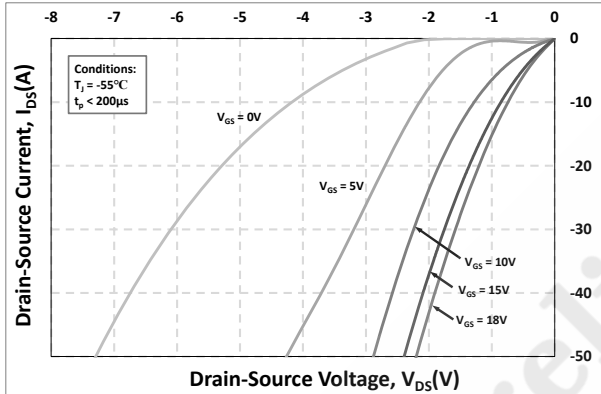


Figure 13. 3rd Quadrant Characteristic at -55°C

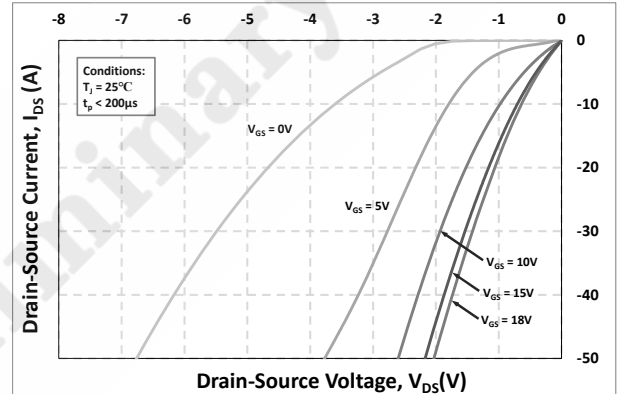


Figure 14. 3rd Quadrant Characteristic at 25°C

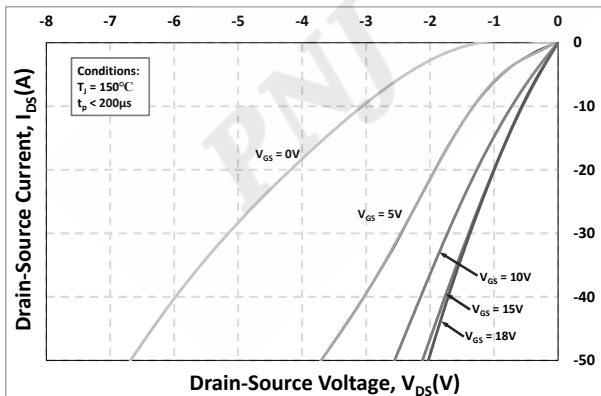


Figure 15. 3rd Quadrant Characteristic at 150°C

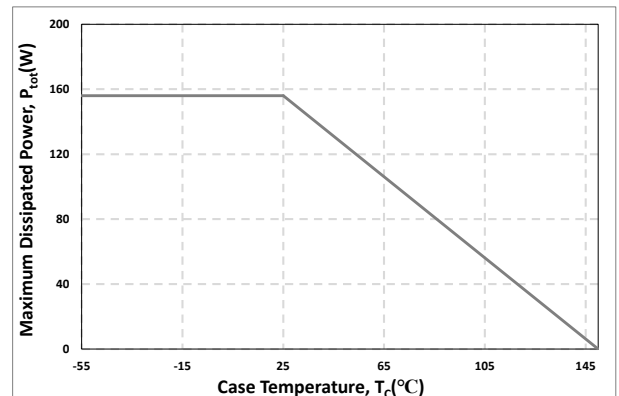


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

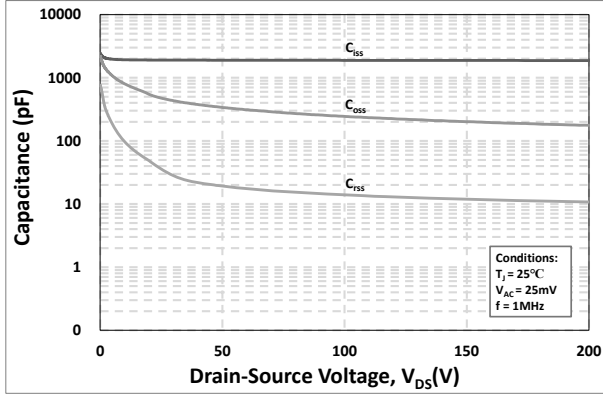


Figure 17. Capacitances vs. Drain-Source Voltage (0 - 200V)

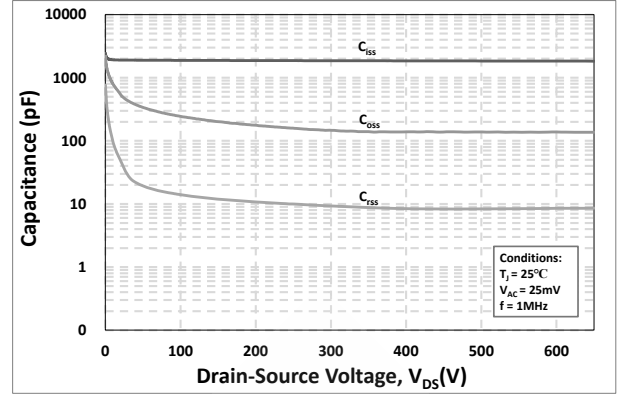


Figure 18. Capacitances vs. Drain-Source Voltage (0 - 650V)

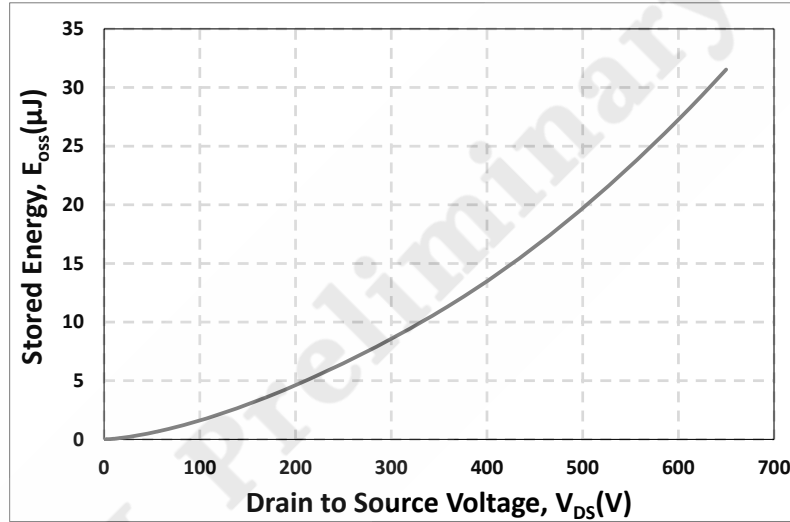
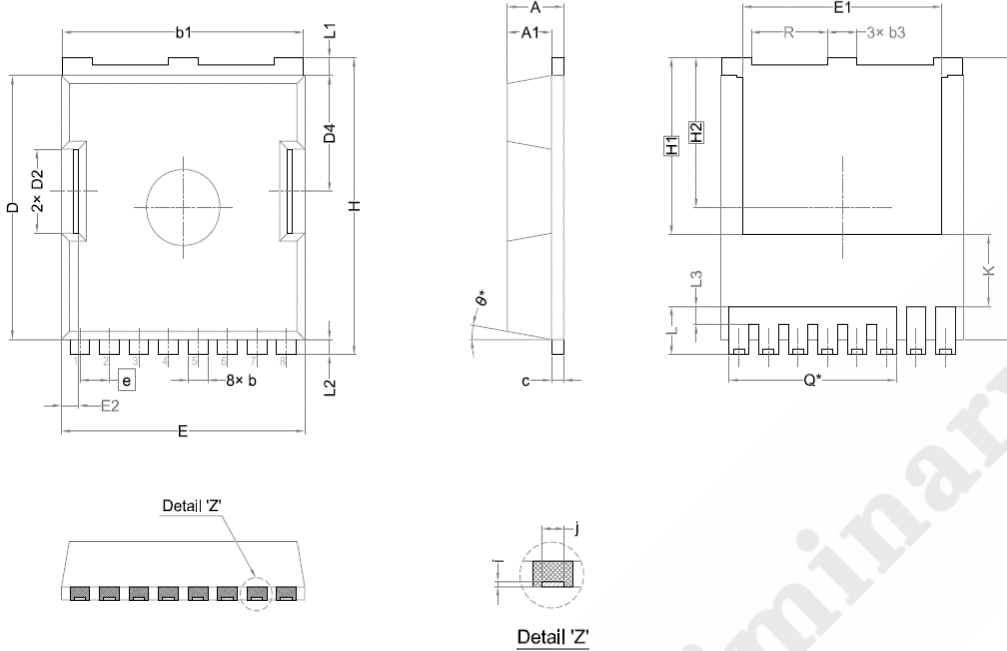


Figure 19. Output Capacitor Stored Energy



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6. Package Outlines



SYMBOL	DIMENSIONS		
	MIN.	NOM.	MAX.
A	2.20	2.30	2.40
A1	1.70	1.80	1.90
b	0.70	0.80	0.90
b1	9.70	9.80	9.90
b3	1.10	1.20	1.30
c	0.40	0.50	0.60
D	10.28	10.38	10.48
D1	10.98	11.08	11.18
D2	3.20	3.30	3.40
D4	4.45	4.55	4.65
E	9.80	9.90	10.00
E1	8.00	8.10	8.20
E2	0.60	0.70	0.80
e	1.20 BSC		
H	11.58	11.68	11.78
H1	6.95 BSC		
H2	5.89 BSC		
i	0.10 REF.		
j	0.46 REF.		
K	2.80 REF.		
L	1.40	1.90	2.10
L1	0.60	0.70	0.80
L2	0.50	0.60	0.70
L3	0.30	0.70	0.80
N	8		
Q	6.80 REF.		
R	3.00	3.10	3.20
θ	10° REF.		

Drawing and Dimensions

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