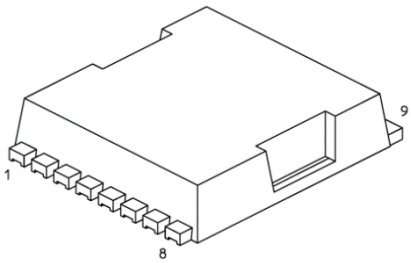
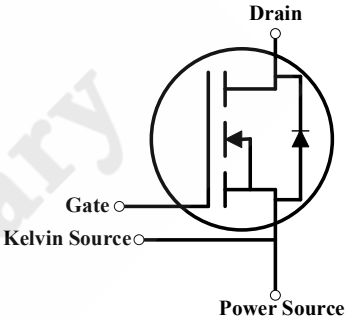
SiC MOS P3M06040L8
N-Channel Enhancement Mode



Features

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



Benefits

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

TOLL

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

Applications

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

Order Information

Part Number	Package	Marking
P3M06040L8	TOLL	P3M06040L8

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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}= 0V I_D= 100μA
Gate - Source Voltage (dynamic)	V_{GSmax}	-8 / +20	V	AC (f>1 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	62	A	V_{GS}= 15V T_C= 25℃
		39		V_{GS}= 15V T_C= 100℃
Pulsed Drain Current	$I_{D(pulse)}$	123	A	
Power Dissipation	P_D	212	W	
Operating Junction	T_J	-55 To +150	℃	
Storage Temperature	T_{stg}	-55 To +150	℃	
Solder Temperature	T_L	260	℃	

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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	$V_{(BR)DSS}$	650	/	/	V	V_{GS}= 0V I_D= 100μA
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= 7.5mA T_J = 25℃
		/	1.8	/	V	V_{DS}= V_{GS} I_D= 7.5mA T_J = 150℃
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	$R_{DS(on)}$	/	40	52	mΩ	V_{GS}= 15V I_D= 40A T_J= 25℃
		/	36	/		V_{GS}= 18V I_D= 40A T_J= 25℃
Trans conductance	g_{fs}	/	16	/	S	V_{DS}= 20V I_{DS}= 40A T_J= 25℃
		/	15	/		V_{DS}= 20V I_{DS}= 40A T_J= 150℃

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Parameter	Symbol	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
Input Capacitance	C_{iss}	/	3398	/	pF	V_{GS}= 0V V_{DS}= 400V f= 1MHz V_{AC}= 25mV
Output Capacitance	C_{oss}	/	243	/		
Reverse Transfer Capacitance	C_{rss}	/	9.7	/		
Coss Stored Energy	E_{oss}	/	46.4	/	μJ	
Internal Gate Resistance	$R_{G(int)}$	/	0.9	/	Ω	f= 1MHz V_{AC}= 25mV
Gate to Source Charge	Q_{gs}	/	41.2	/	nC	V_{DS}= 400V I_{DS}= 40A V_{GS}= -3 to 15V I_G= 20mA
Gate to Drain Charge	Q_{gd}	/	20.5	/		
Total Gate Charge	Q_g	/	87.3	/		

3. Reverse Diode Characteristics

At T_J= 25℃, unless specified otherwise

Parameter	Symbol	Value		Unit	Test Conditions
		Typ.	Max.		
Diode Forward Voltage	V_{SD}	5.7	/	V	V_{GS}= -3V I_{SD}= 20A T_J= 25℃
		5.0	/	V	V_{GS}= -3V I_{SD}= 20A T_J= 150℃
Continuous Diode Forward Current	I_S	35	/	A	V_{GS}= -3V

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4. Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction to Case	$R_{\theta JC}$	0.59	℃/W

5. Typical Performance

At T_J= 25℃, unless specified otherwise

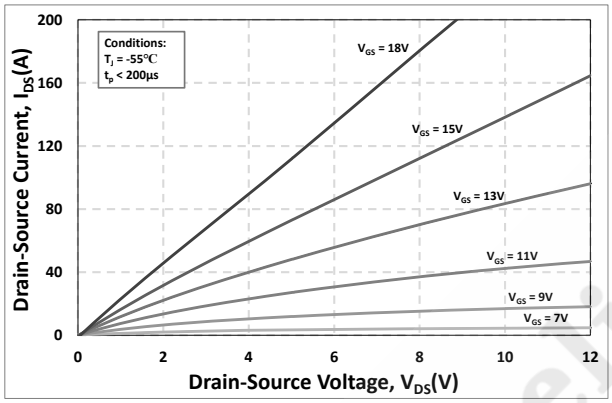

Figure 1. Output Characteristics T_J= -55℃

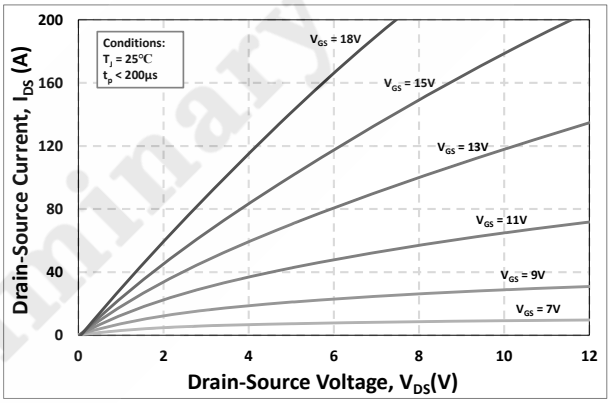

Figure 2. Output Characteristics T_J= 25℃

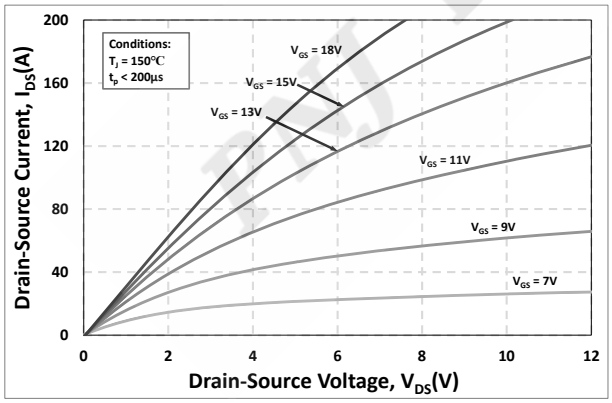

Figure 3. Output Characteristics T_J= 150℃

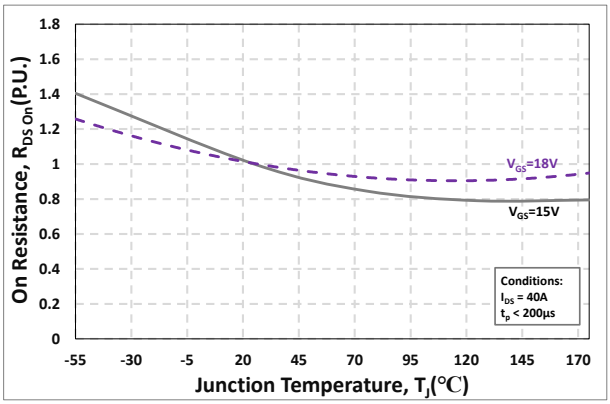

Figure 4. Normalized On-Resistance vs. Temperature

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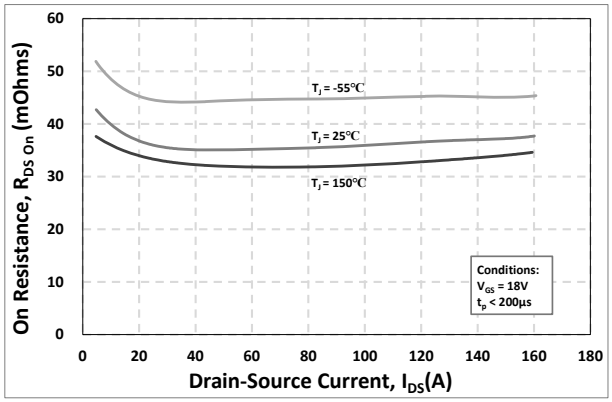

Figure 5. On-Resistance vs. Drain Current Various Temperatures

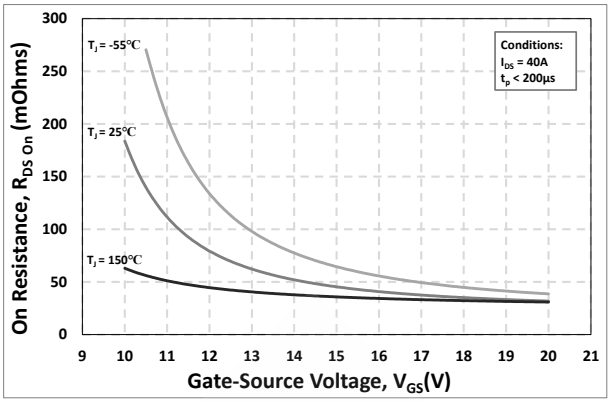

Figure 6. On-Resistance vs. Gate-Source Voltage

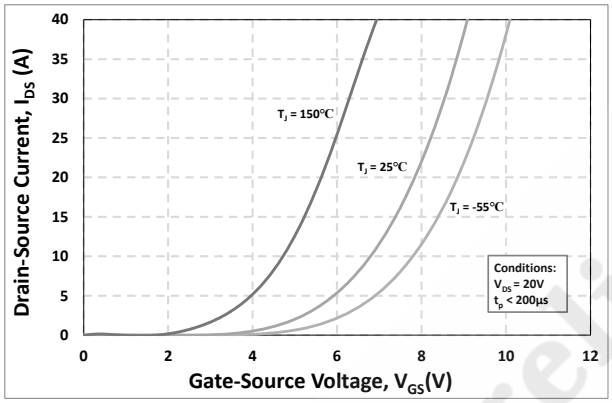

Figure 7. Transfer Characteristic for Various Junction Temperatures

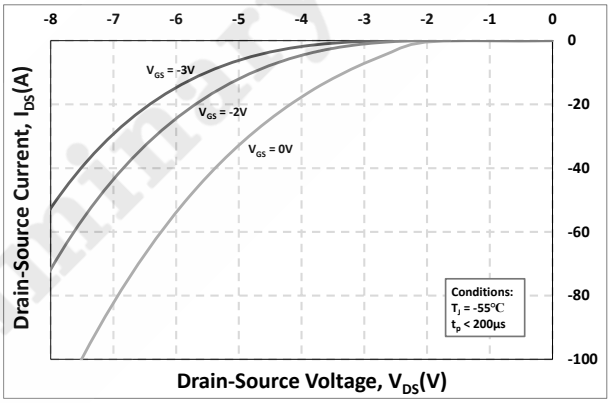

Figure 8. Body Diode Characteristic at -55°C

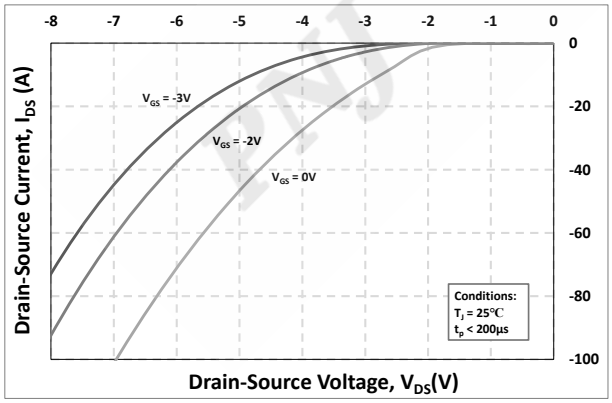

Figure 9. Body Diode Characteristic at 25°C

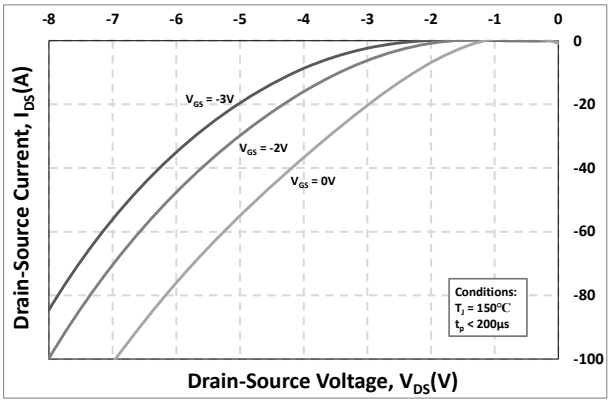

Figure 10. Body Diode Characteristic at 150°C

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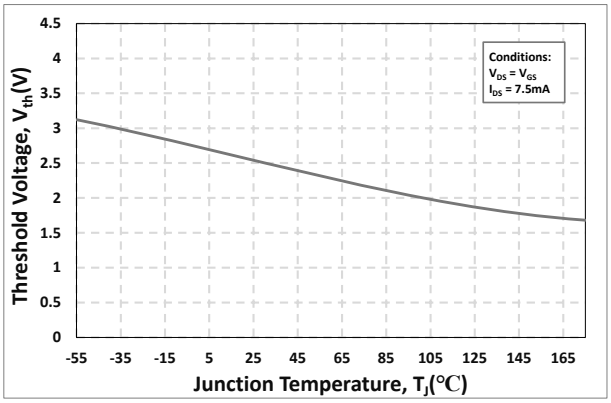

Figure 11. Threshold Voltage vs. Temperature

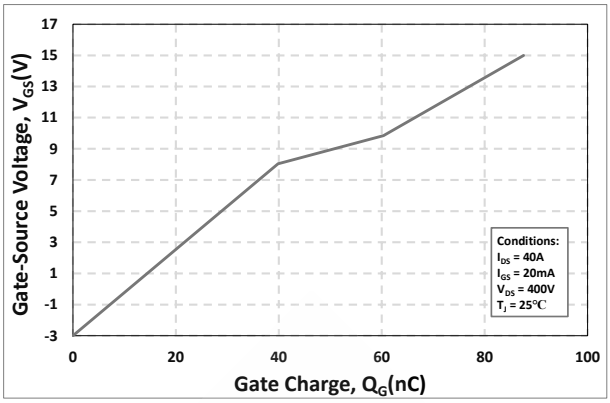

Figure 12. Gate Charge Characteristics

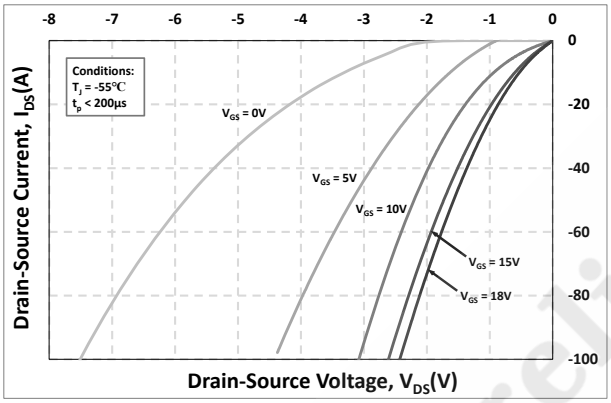

Figure 13. 3rd Quadrant Characteristic at -55°C

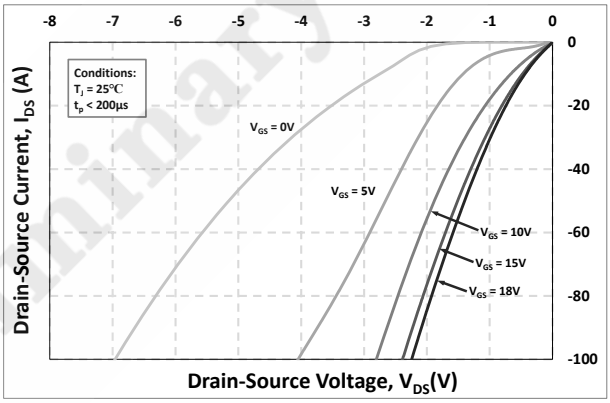

Figure 14. 3rd Quadrant Characteristic at 25°C

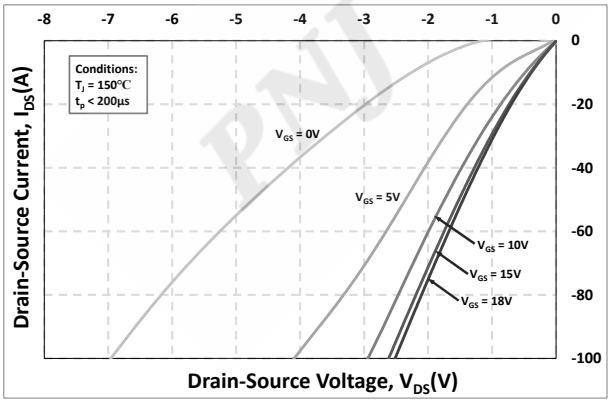

Figure 15. 3rd Quadrant Characteristic at 150°C

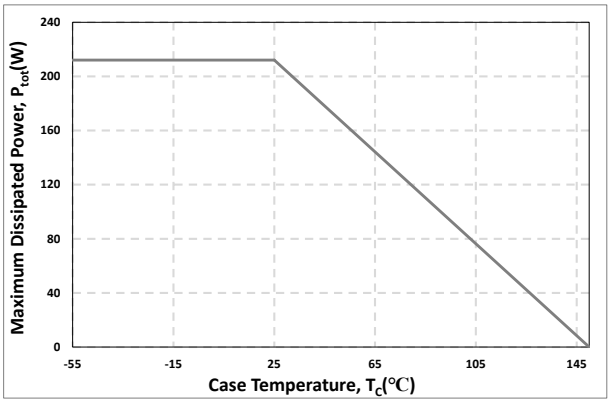

Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

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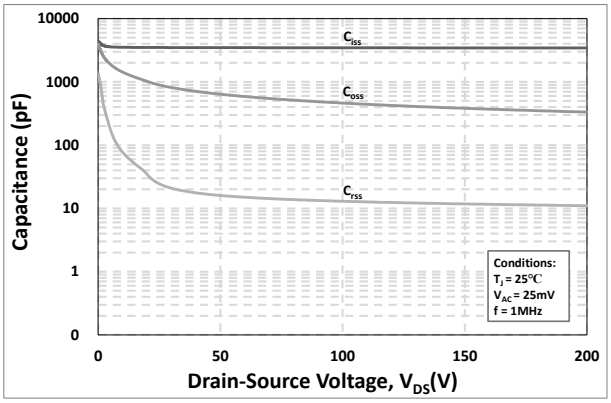

Figure 17. Capacitances vs. Drain-Source Voltage (0 - 200V)

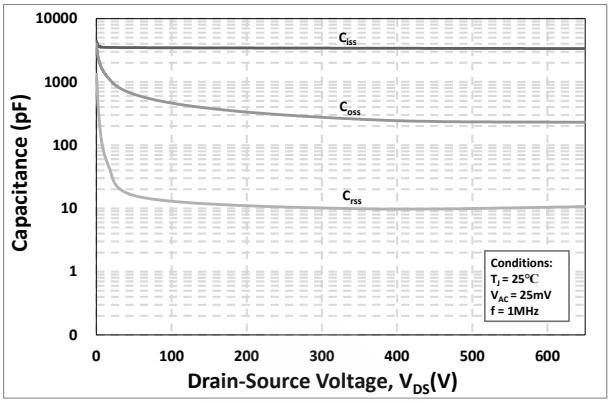

Figure 18. Capacitances vs. Drain-Source Voltage (0 - 650V)

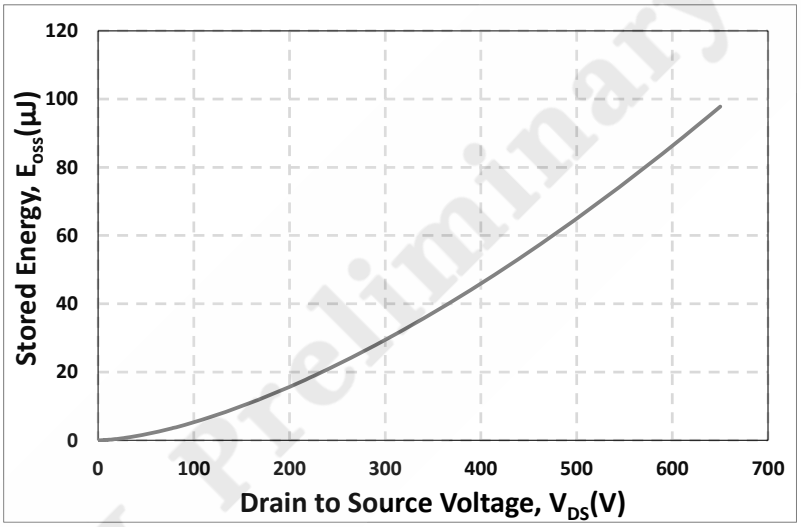

Figure 19. Output Capacitor Stored Energy

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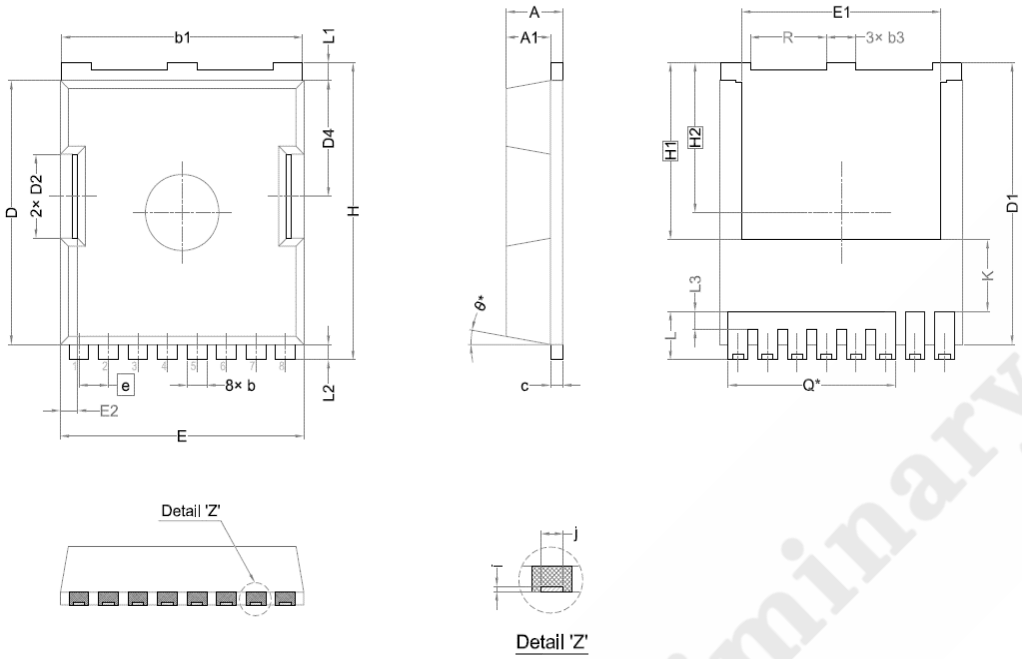
6. Package Outlines



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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