

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	$I_D@25^{\circ}C$
650V	38mΩ@18V	99A

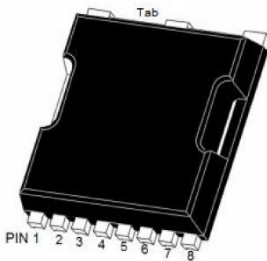
Feature

- Wide bandgap SiC MOSFET technology
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed switching
- Low reverse recovery(Qrr)

Application

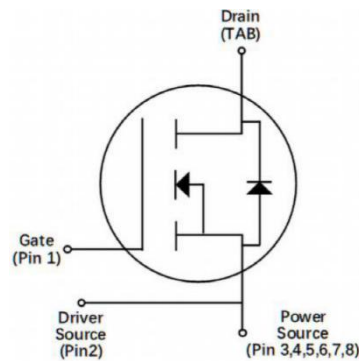
- Switch mode power supplies
- Renewable energy
- On Board Charger
- High voltage DC/DC converters

Package

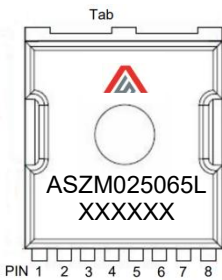


TOLL

Circuit diagram



Marking



Absolute maximum ratings (Tc=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Value	Unit
Drain-Source Voltage	V _{DS}	V _{GS} = 0V, I _D = 100μA	650	V
Gate-Source Voltage	V _{GSmax}	AC (f > 1 Hz)	-10/+25	V
Gate-Source Voltage	V _{GSOP}	Static	-4/+18	V
Continuous Drain Current	I _D	V _{GS} = 18V, T _C =25°C	99	A
	I _D	V _{GS} = 18V, T _C =100°C	70	
Pulsed Drain Current	I _{D,pulse}	Pulse with t _p limited by T _{jmax} at 1ms	157	A
		Pulse with t _p limited by T _{jmax} at 100μs	279	
Power Dissipation	P _D	T _C =25°C	333	W
Thermal Resistance (Typ)	R _{θJC}	Junction-to-Case	0.45	°C/W
Junction Temperature	T _J		-55~ +175	°C
Storage Temperature	T _{STG}		-55~ +175	°C

Electrical characteristics (Tj=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = 100μA	650			V
Zero gate voltage drain current	I _{DSS}	V _{DS} = 650V, V _{GS} = 0V			50	μA
Gate-Source leakage current	I _{GSS}	V _{GS} = 18V, V _{DS} = 0V			250	nA
Gate threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 16mA		3.0		V
		V _{DS} = V _{GS} , I _D = 16mA, T _J = 175°C		2.0		
Drain-source on-resistance	R _{DS(on)}	V _{GS} = 18V, I _D = 40A		26	38	mΩ
		V _{GS} = 18V, I _D = 40A, T _J = 175°C		35		
Transconductance	g _{fs}	V _{DS} = 18V, I _D = 40A		27		S
		V _{DS} = 18V, I _D = 40A, T _J = 175°C		25		
Dynamic characteristics						
Input Capacitance	C _{iss}	V _{DS} = 600V, V _{GS} = 0V, f = 1 MHz V _{AC} = 25mV		2543		pF
Output Capacitance	C _{oss}			173		
Reverse Transfer Capacitance	C _{rss}			8		
Internal Gate Resistance	R _{G(int)}	f = 1 MHz, V _{AC} = 25mV		1.2		Ω
Total Gate Charge	Q _g	V _{DS} = 400V, I _D = 40A V _{GS} = -4/18V		74.5		nC
Gate-Source Charge	Q _{gs}			29		
Gate-Drain Charge	Q _{gd}			35		
Turn-on delay time	t _{d(on)}	V _{DS} = 400V, V _{GS} = -4V/+18V, I _D = 40A, R _{G(ext)} = 5Ω, L = 294μH		3		nS
Turn-on rise time	t _r			18		
Turn-off delay time	t _{d(off)}			22		
Turn-off fall time	t _f			5		
Turn-On Energy	E _{on}			56		μJ
Turn-Off Energy	E _{off}			66		
Total switching energy	E _{tot}			122		
Source-Drain Diode characteristics						
Diode Forward Current	I _S	V _{GS} = -4V, T _C = 25°C		66		A
Diode Forward voltage	V _{SD}	V _{GS} = -4V, I _{SD} = 20A		4.3		V
		V _{GS} = -4V, I _{SD} = 20A, T _J = 175°C		3.7		V
Diode pulse Current	I _{S, pulse}	V _{GS} = -4V, pulse width t _p limited by T _{jmax}		157		A
Reverse Recovery Time	t _{rr}	V _{GS} = -4V, I _{SD} = 40A, V _R = 400V, dif/dt = 3600A/us		18		nS
Reverse Recovery Charge	Q _{rr}			309		nC
Peak Reverse Recovery Current	I _{rrm}			26		A

Typical Characteristics

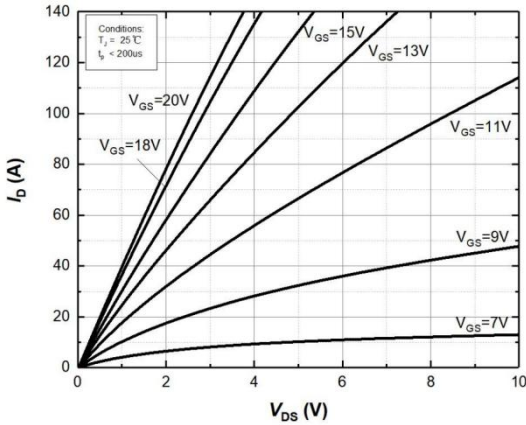


Figure 1. Output characteristics at $T_j=25^\circ\text{C}$

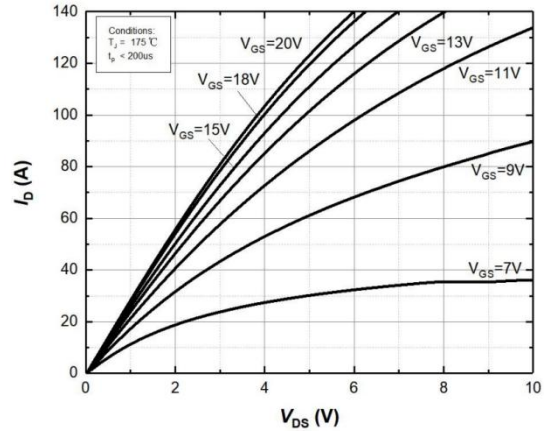


Figure 2. Output characteristics at $T_j=175^\circ\text{C}$

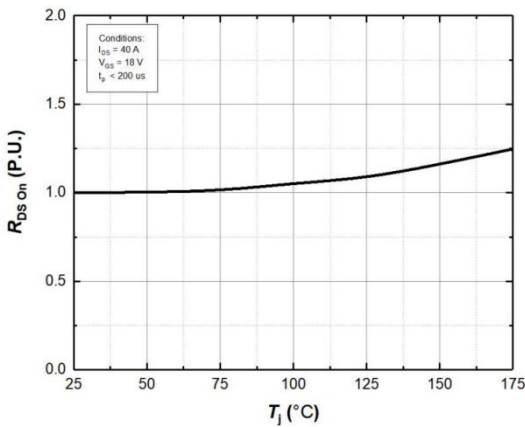


Figure 3. Normalized On-Resistance vs. Temperature

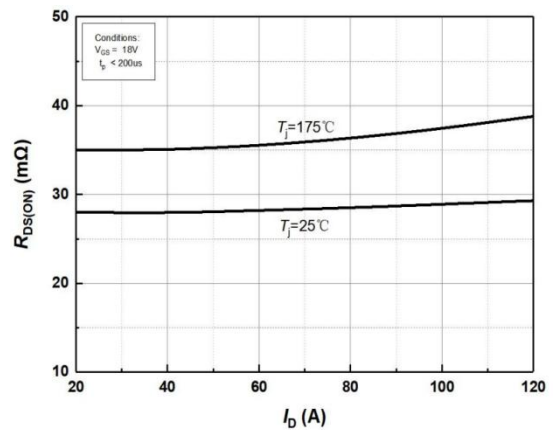


Figure 4. On-Resistance vs. Drain current for Various Temperature

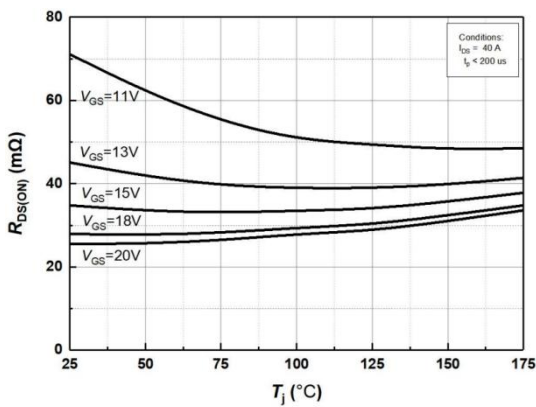


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

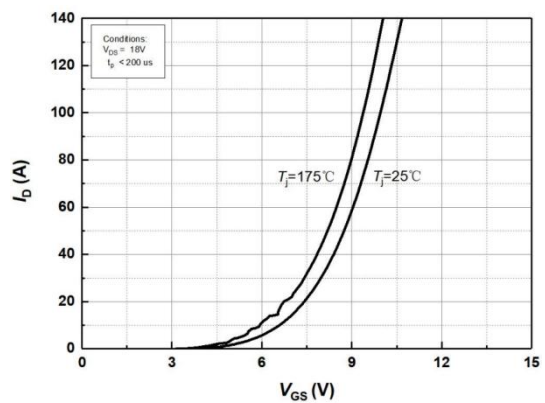


Figure 6. Transfer Characteristics for Various Junction Temperatures

Typical Characteristics

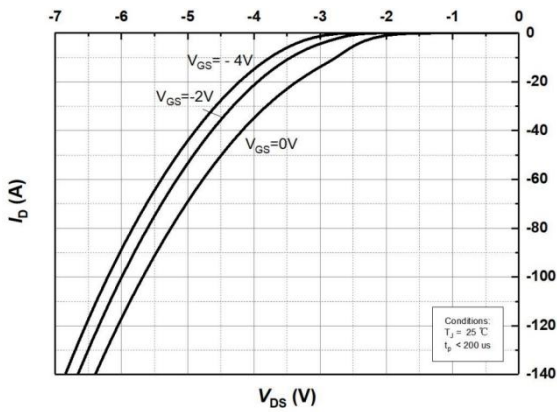


Figure 7. Body Diode Characteristics at $T_j=25^\circ\text{C}$

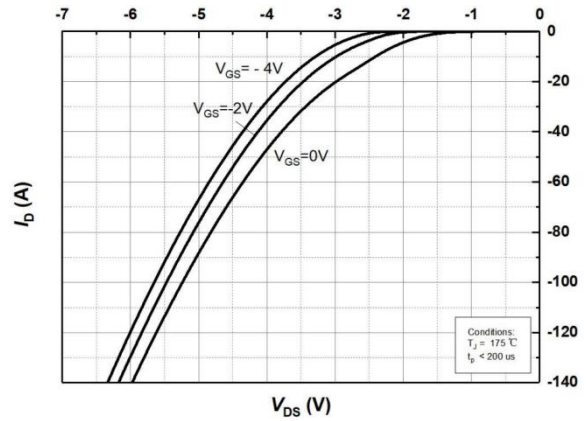


Figure 8. Body Diode Characteristics at $T_j=175^\circ\text{C}$

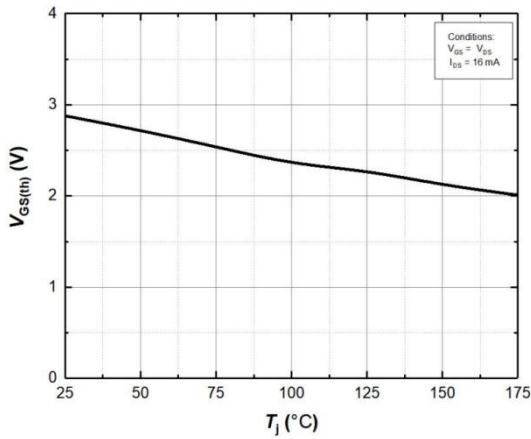


Figure 9. Threshold Voltage vs. Temperature

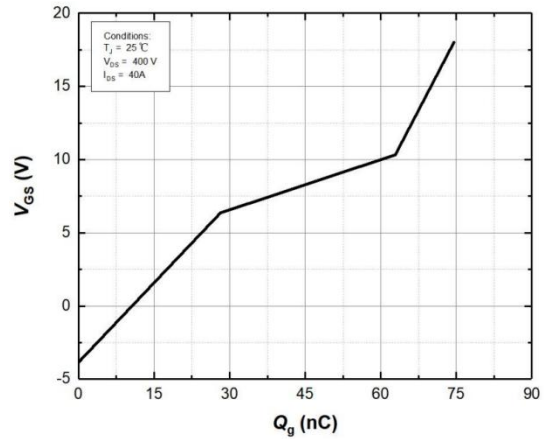


Figure 10. Gate Charge Characteristics

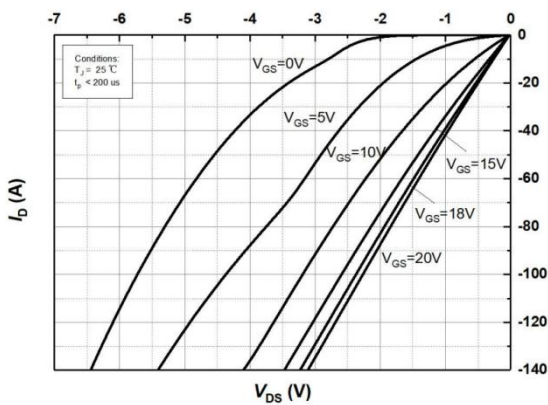


Figure 11. 3rd Quadrant Characteristic at $T_j=25^\circ\text{C}$

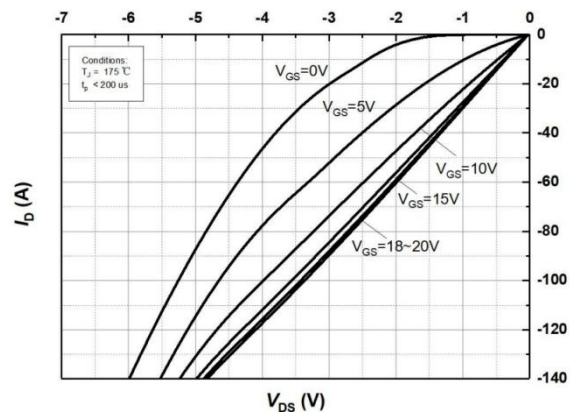


Figure 12. 3rd Quadrant Characteristic at $T_j=175^\circ\text{C}$

Typical Characteristics

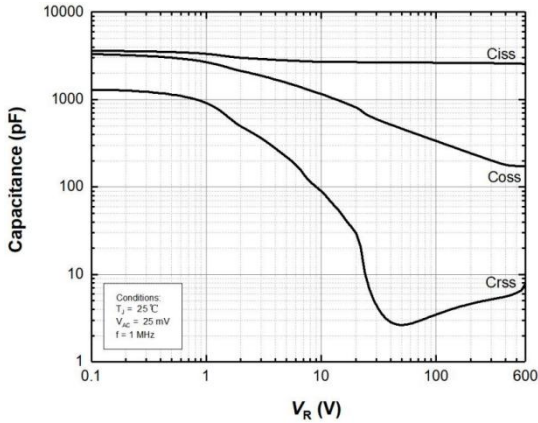


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 600V)

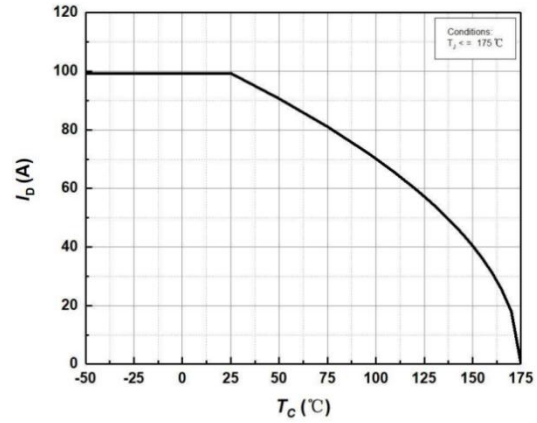


Figure 14. Continuous Drain Current Derating vs Case Temperature

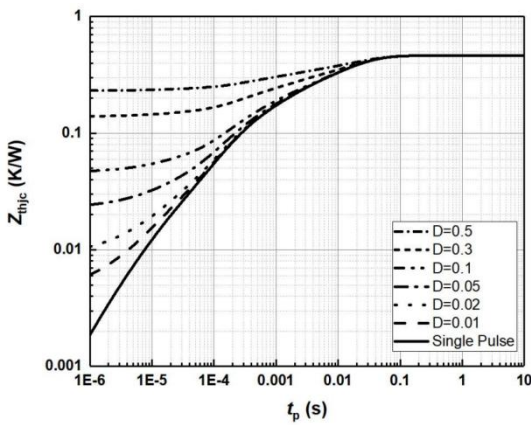


Figure 15. Transient Thermal Impedance (Junction – Case)

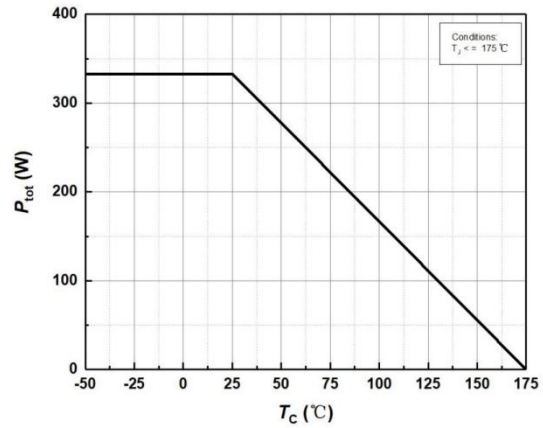


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

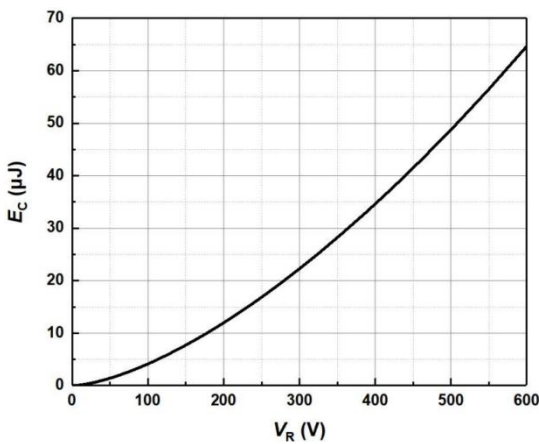


Figure 17. Output Capacitor Stored Energy

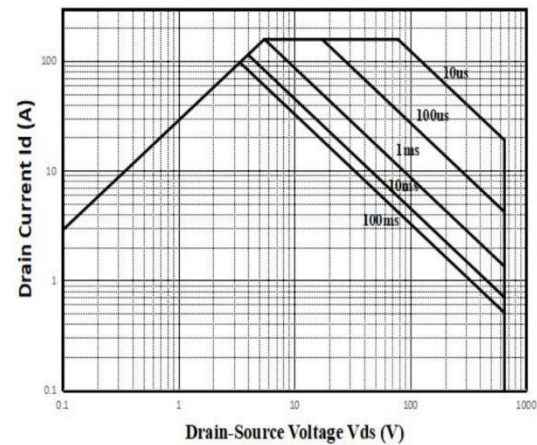


Figure 18. Safe Operating Area

Typical Characteristics

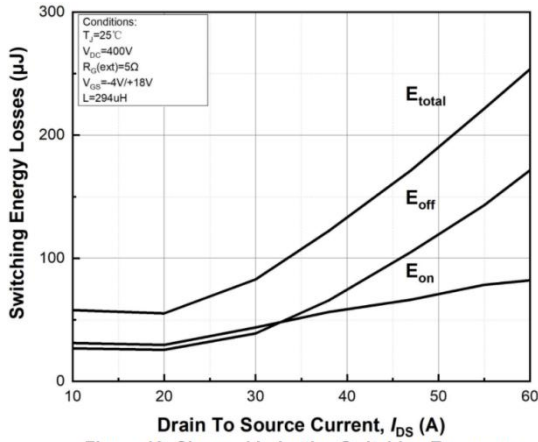


Figure 19. Clamped Inductive Switching Energy vs. Drain Current ($V_{DD} = 400V$)

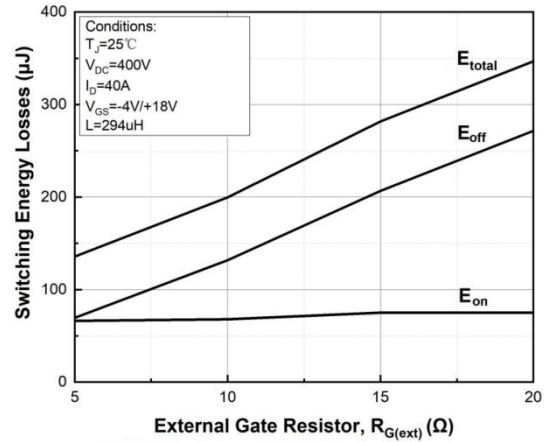


Figure 20. Clamped Inductive Switching Energy vs. $R_{G(ext)}$

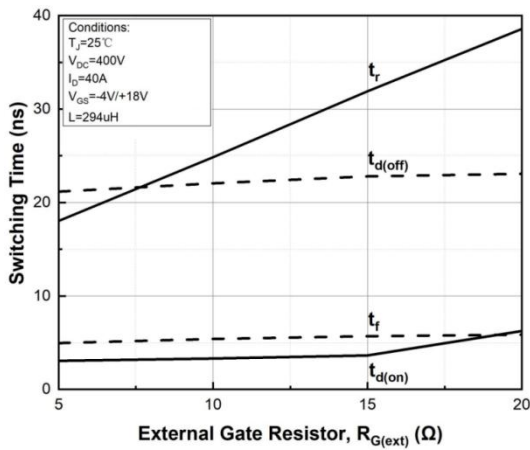
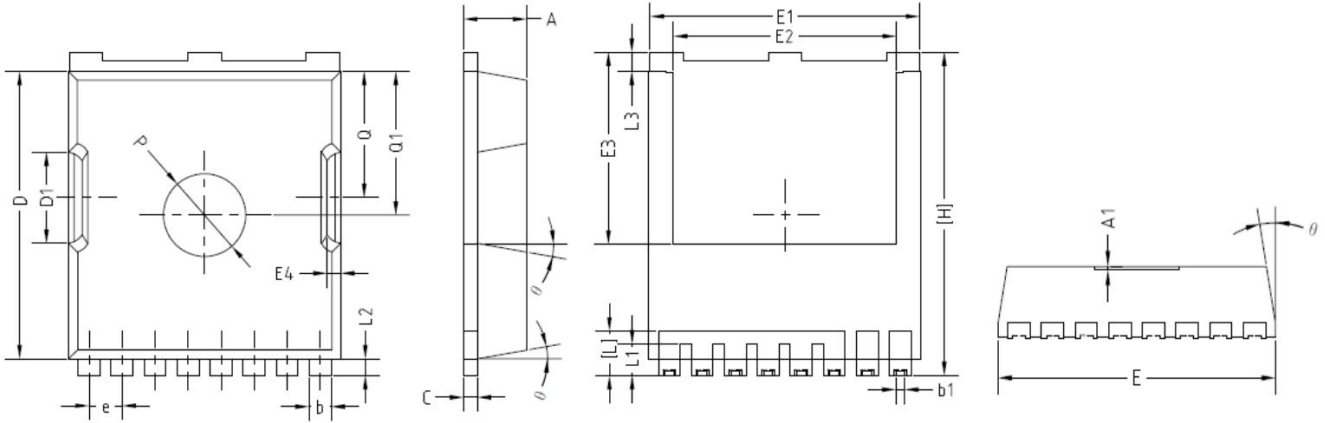


Figure 21. Switching Times vs. $R_{G(ext)}$

TOLL Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.050	0.150	0.002	0.006
b	0.700	0.900	0.028	0.035
b1	0.350	0.450	0.014	0.018
C	0.400	0.650	0.016	0.026
D	10.280	10.700	0.405	0.421
D1	3.200	3.400	0.126	0.134
E	9.800	10.000	0.386	0.394
E1	9.700	9.900	0.382	0.390
E2	7.950	8.250	0.313	0.325
E3	6.800	7.200	0.268	0.283
E4	0.300	0.750	0.012	0.030
e	1.150	1.250	0.045	0.049
L	1.400	2.100	0.055	0.083
L1	1.050	1.350	0.041	0.053
L2	0.500	0.700	0.020	0.028
L3	0.600	0.800	0.024	0.031
θ	8°	12°	8°	12°
P	2.900	3.100	0.114	0.122
Q	4.450	4.700	0.175	0.185
Q1	5.100	5.300	0.201	0.209
H	11.550	11.900	0.455	0.469