

Features

- Uses PingWei advanced PerfectMOS technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent $Q_g \times R_{DS(on)}$ product(FOM)
- Excellent Low Ciss
- Qualified according to JEDEC criteria

Benefits

- High robustness and reliability
- Increases maximum current capability
- Low power loss, high power density
- Easy paralleling

Applications

- Synchronous Rectification for AC/DC Quick Charger
- Battery management
- UPS (Uninterruptible Power Supplies)

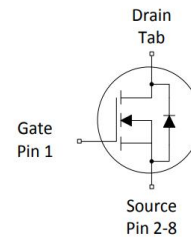
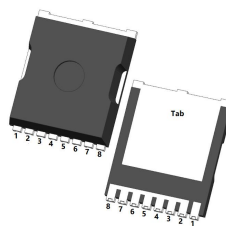


100% DVDS Tested
100% Avalanche Tested

Product Summary

V_{DS}	120V
$R_{DS(on)@10V}$ typ	1.8mΩ
I_D	278A

TOLL-1L



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
PW022N12TS	PW022N12TS	TOLL-1L	Tape&Reel	13 inches	24mm	1500pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	120	V
Continuous drain current	I_D	278	A
$T_C = 25^\circ\text{C}$ (Silicon limit)		300	
$T_C = 25^\circ\text{C}$ (Package limit)		176	
$T_C = 100^\circ\text{C}$ (Silicon limit)		18	
$T_a = 25^\circ\text{C}$			
Pulsed drain current ($T_C = 25^\circ\text{C}$)	$I_{D\ pulse}$	1113	A
Avalanche energy, single pulse (L=0.4mH)	E_{AS}	720	mJ
Gate-Source voltage	V_{GS}	± 20	V
Power dissipation	P_{tot}	362	W
$T_C = 25^\circ\text{C}$		1.5	
$T_a = 25^\circ\text{C}$			
Operating junction and storage temperature	T_j, T_{stg}	-55...+150	$^\circ\text{C}$
Soldering temperature, wave soldering only allowed at leads (1.6mm from case for 10s)	T_{sold}	260	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Thermal resistance, junction – case.	RthJC	-	-	0.35	°C/W	-
Thermal resistance, junction - ambient(min. footprint)	RthJA	-	-	84	°C/W	-

Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		

Static Characteristic

Drain-source breakdown voltage	BV_{DSS}	120	-	-	V	$V_{GS}=0V, I_D=250\mu A$
Gate threshold voltage	$V_{GS(th)}$	2.0	-	4.0	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Zero gate voltage drain current	I_{DSS}	-	-	10 100	μA	$V_{DS}=120V, V_{GS}=0V$ $T_j=25^\circ C$ $T_j=150^\circ C$
Gate-source leakage current	I_{GSS}	-	-	± 100	nA	$V_{GS}=\pm 20V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	1.8	2.2	mΩ	$V_{GS}=10V, I_D=20A$
Transconductance	g_{fs}	-	90	-	S	$V_{DS}=5V, I_D=20A$

Dynamic Characteristic

Input Capacitance	C_{iss}	-	11020	-	pF	$V_{GS}=0V, V_{DS}=60V,$ $f=1MHz$
Output Capacitance	C_{oss}	-	1347	-		
Reverse Transfer Capacitance	C_{rss}	-	20	-		
Gate Total Charge	Q_G	-	140	-	nC	$V_{DS}=60V, I_D=20A,$ $V_{GS}=10V$
Gate-Source charge	Q_{gs}	-	40	-		
Gate-Drain charge	Q_{gd}	-	20	-		
Turn-on delay time	$t_{d(on)}$	-	30	-	ns	$V_{GS}=10V, V_{DD}=60V,$ $R_{G_ext}=10\Omega, I_D=20A$
Rise time	t_r	-	20	-		
Turn-off delay time	$t_{d(off)}$	-	51	-		
Fall time	t_f	-	15	-		
Gate resistance	R_G	-	1	-	Ω	$V_{GS}=0V, V_{DS}=0V,$ $f=1MHz$



Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	-	1.2	V	$V_{GS}=0V, I_{SD}=20A$
Body Diode Continuous Forward Current	I_S	-	-	278	A	TC = 25°C
Body Diode Pulsed Current	I_S pulse	-	-	1113	A	TC = 25°C
Body Diode Reverse Recovery Time	t_{rr}	-	95	-	ns	$I_F=20A,$ $dI/dt=100A/\mu s$
Body Diode Reverse Recovery Charge	Q_{rr}	-	209	-	nC	

Typical Performance Characteristics

Fig 1: Output Characteristics

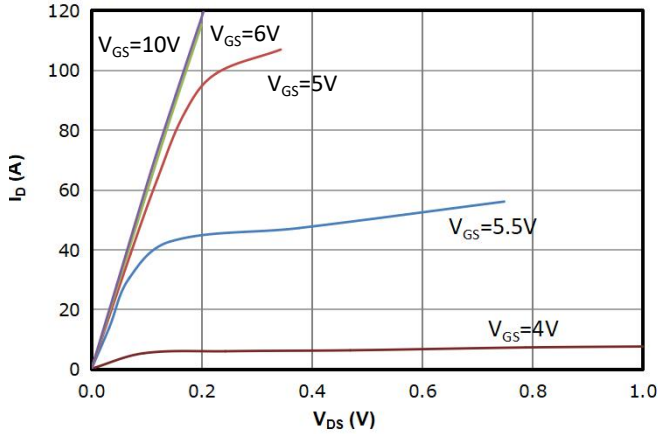


Fig 2: Transfer Characteristics

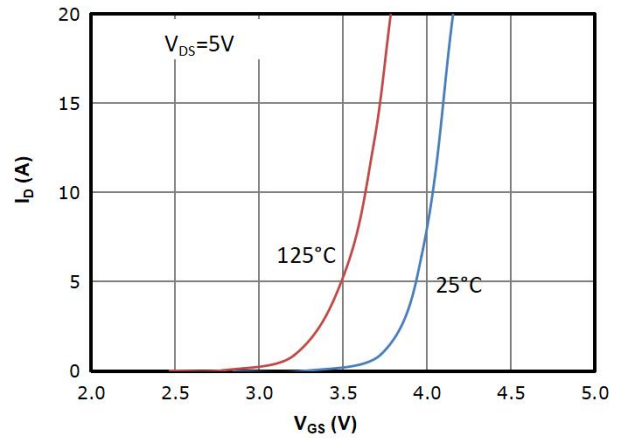


Fig 3: $R_{DS(on)}$ vs Drain Current and Gate Voltage

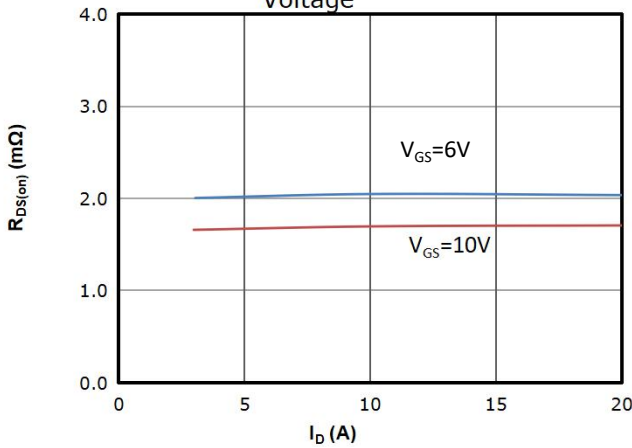


Fig 4: $R_{DS(on)}$ vs Gate Voltage

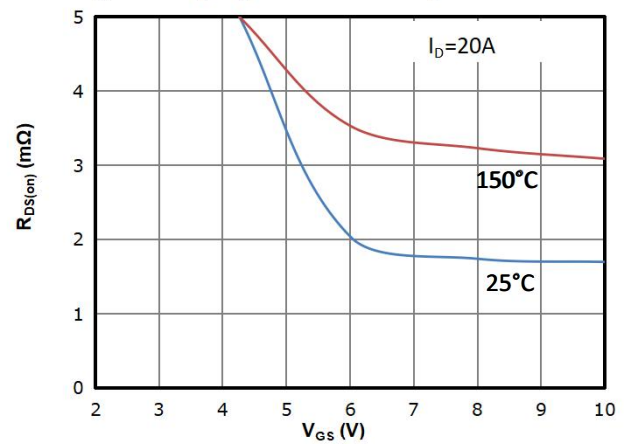


Fig 5: $R_{DS(on)}$ vs. Temperature

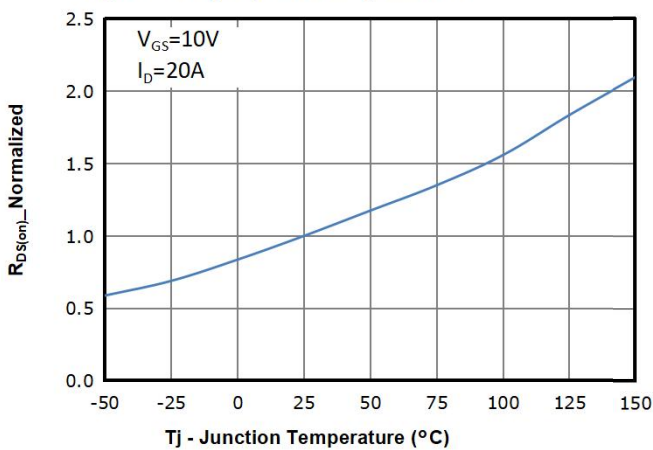


Fig 6: $V_{GS(th)}$ vs. Temperature

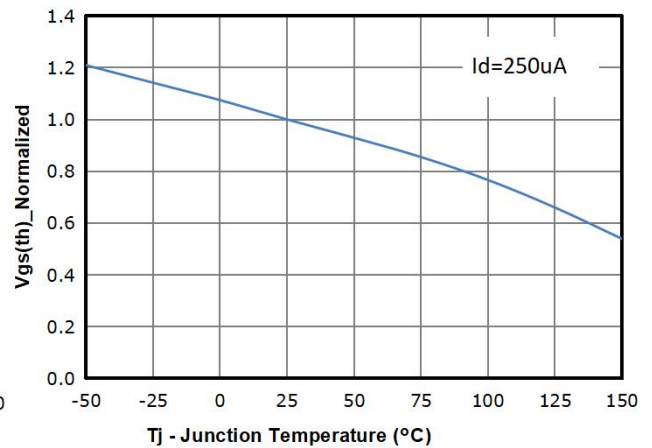


Fig 7: BVdss vs. Temperature

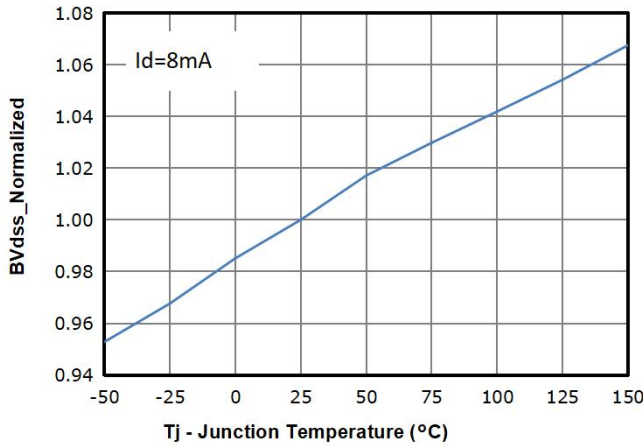


Fig 8: Capacitance Characteristics

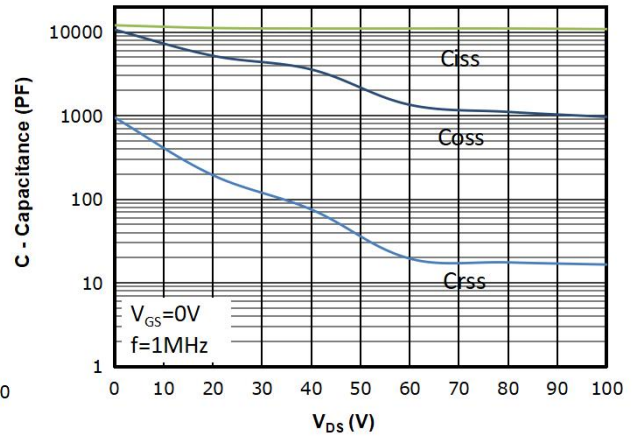


Fig 9: Gate Charge Characteristics

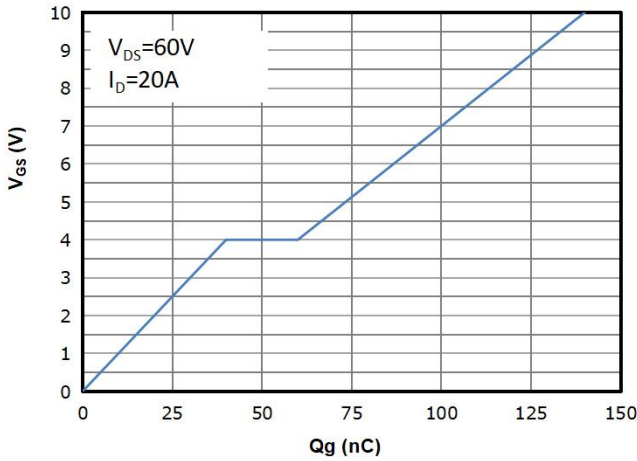


Fig 10: Body-diode Forward Characteristics

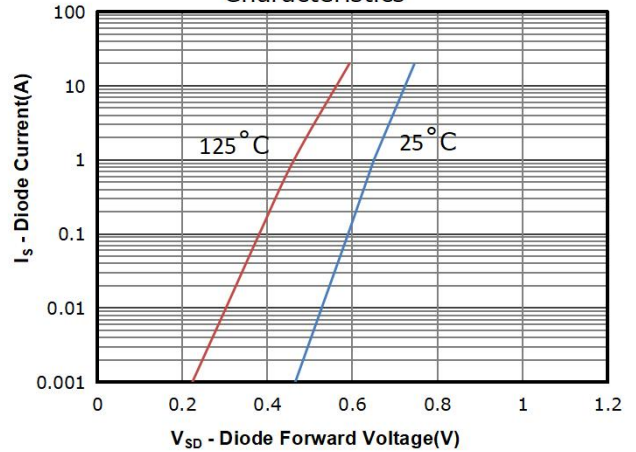


Fig 11: Power Dissipation

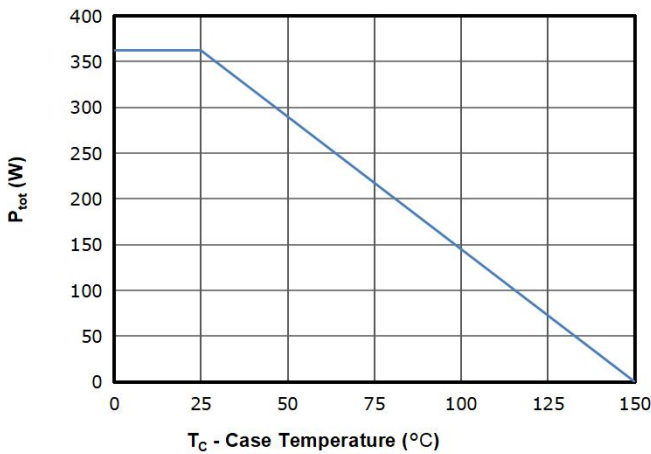


Fig 12: Drain Current Derating

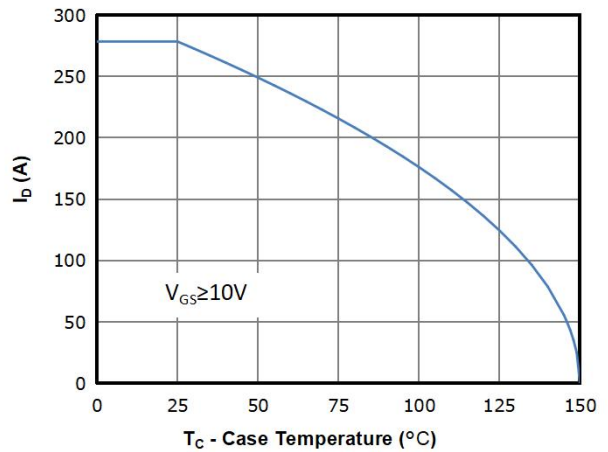


Fig 13: Safe Operating Area

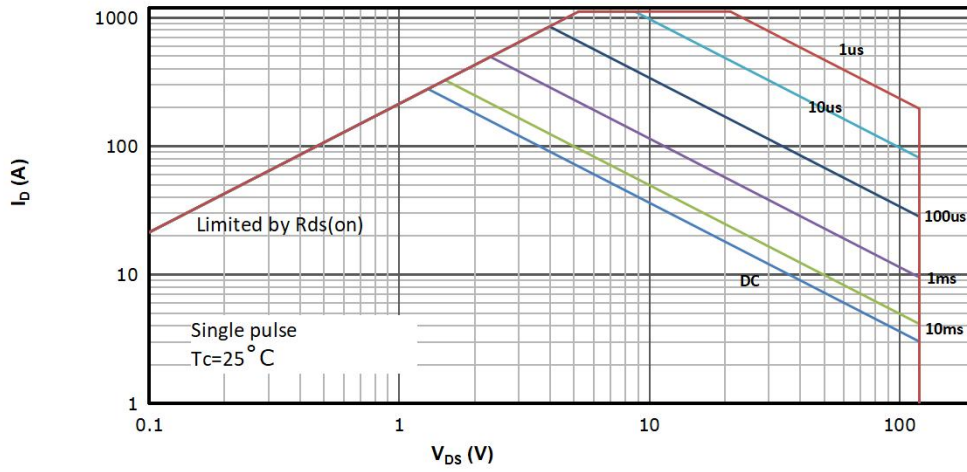
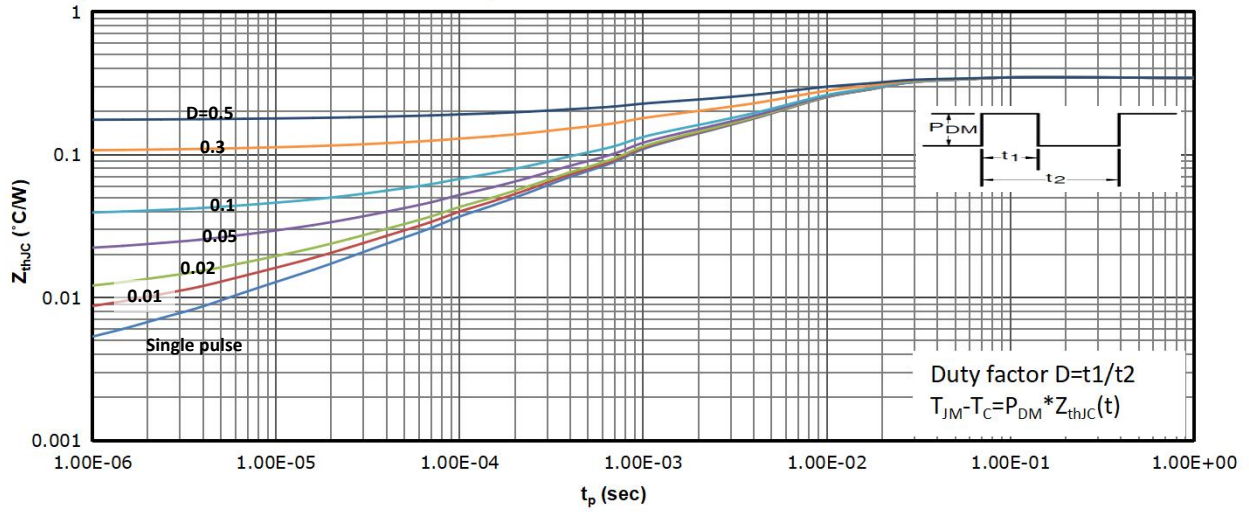


Fig 14: Max. Transient Thermal Impedance

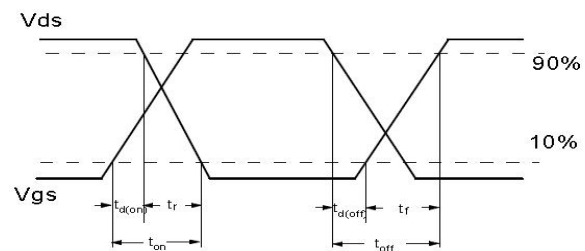


Test Circuit & Waveform

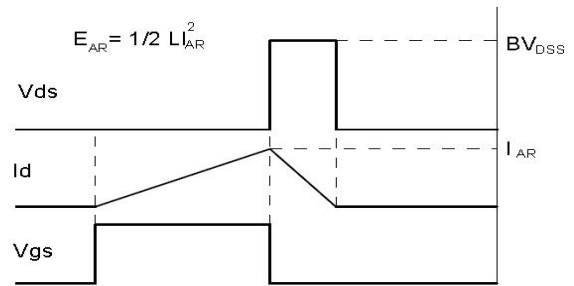
Gate Charge Test Circuit & Waveform



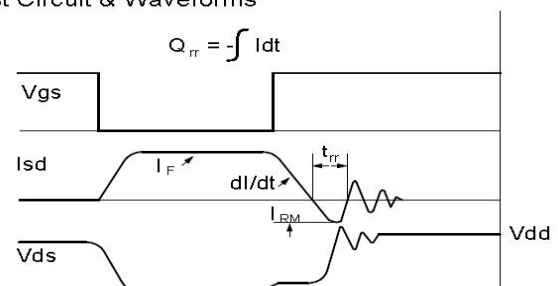
Resistive Switching Test Circuit & Waveforms



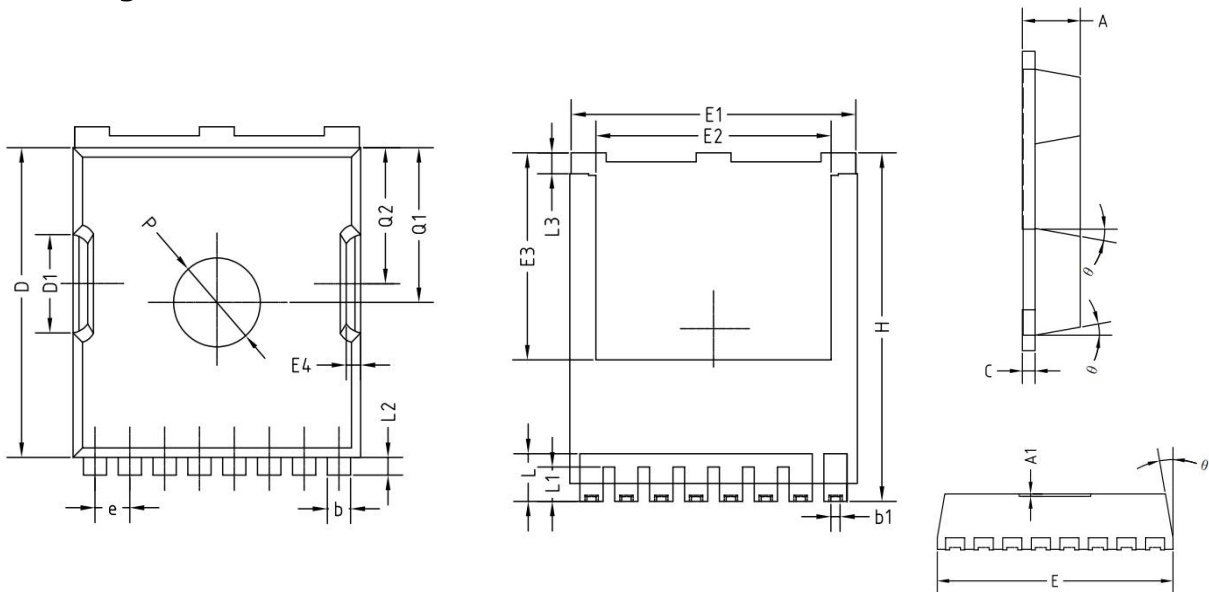
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outline: TOLL-1L



SYMBOL	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.20	2.40	0.087	0.094
A1	0.05	0.20	0.002	0.008
b	0.65	0.85	0.026	0.033
b1	0.30	0.50	0.012	0.020
C	0.35	0.65	0.014	0.026
D	10.35	10.70	0.407	0.421
D1	3.15	3.45	0.124	0.136
E	9.80	10.00	0.386	0.394
E1	9.65	9.95	0.380	0.392
E2	7.90	8.30	0.311	0.327
E3	6.80	7.20	0.268	0.283
E4	0.30	0.75	0.012	0.030
e	1.15	1.25	0.045	0.049
L	1.35	1.85	0.053	0.073
L1	0.95	1.35	0.037	0.053
L2	0.40	0.80	0.016	0.031
L3	0.60	0.85	0.024	0.033
θ	7°	12°	7°	12°
P	2.90	3.10	0.114	0.122
Q	4.50	4.70	0.177	0.185
Q1	5.10	5.30	0.201	0.209
H	11.55	11.95	0.455	0.470



Revision History

Revision	Date	Major changes
1.0	2023/9/1	Release of Formal Version.

Disclaimer

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