

SC045N65ZTK-R

Silicon Carbide MOSFET 650V, 45mΩ, 57A



重庆平伟半导体股份有限公司

Features

- 0 V turn-off gate voltage can be applied
- Extremely low on-resistance $R_{DS(on)}$
- Excellent $Q_g \times R_{DS(on)}$ product(FOM)
- Excellent Low Ciss
- Qualified according to JEDEC criteria

Applications

- SMPS
- Solar PV inverters
- UPS
- EV charging infrastructure
- Energy storage and battery formation

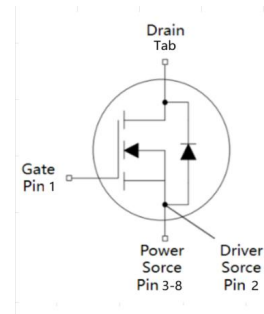
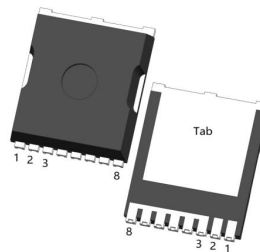


100% DVDS Tested
100% Avalanche Tested

Product Summary

V_{DS}	650V
$R_{DS(on)}$ typ.	45mΩ
I_D	57A

TOLL-2L



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
SC045N65ZTK-R	SC045N65ZTK	TOLL-2L	Tape&Reel	13 inches	24mm	1500pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	650	V
Continuous drain current $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$	I_D	57 40	A
Pulsed drain current ($T_C = 25^\circ\text{C}$)	$I_{D \text{ pulse}}$	170	A
Avalanche energy, single pulse ($L=5\text{mH}$)	E_{AS}	203	mJ
Gate-Source voltage,max.transient voltage	V_{GSmax}	-5/+22	V
Recommended operating values	V_{GSsop}	0/+18	V
Power dissipation $T_C = 25^\circ\text{C}$	P_{tot}	110	W
Operating junction and storage temperature	T_j, T_{stg}	-55...+175	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Thermal resistance, junction – case.	R_{thJC}	-	0.9	1.4	°C/W	-
Thermal resistance, junction - ambient(min. footprint)	R_{thJA}	-	-	40.0	°C/W	-

Electrical Characteristic (at $T_j = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

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

Static Characteristic

Drain-source breakdown voltage	BV_{DSS}	650	-	-	V	$V_{GS}=0V, I_D=100\mu A$
Gate threshold voltage	$V_{GS(th)}$	2.4	3.0	4.4	V	$V_{DS}=V_{GS}, I_D=10mA$
Zero gate voltage drain current	I_{DSS}	-	1	10	μA	$V_{DS}=650V, V_{GS}=0V$ $T_j=25^{\circ}C$ $T_j=175^{\circ}C$
Gate-source leakage current	I_{GSS}	-	-	200	nA	$V_{GS}=22V, V_{DS}=0V$
		-	-	-200	nA	$V_{GS}=-5V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	45	55	mΩ	$V_{GS}=18V, I_D=33A$
Transconductance	g_{fs}	-	26	-	S	$V_{DS}=20V, I_D=35A$

Dynamic Characteristic

Input Capacitance	C_{iss}	-	1300	-	pF	$V_{GS}=0V, V_{DS}=400V,$ $f=1MHz$
Output Capacitance	C_{oss}	-	112	-		
Reverse Transfer Capacitance	C_{rss}	-	6	-		
Gate Total Charge	Q_G	-	50	-	nC	$V_{DS}=400V, I_D=33A$ $V_{GS}=0/18V$
Gate-Source charge	Q_{gs}	-	13	-		
Gate-Drain charge	Q_{gd}	-	19	-		
Turn-on delay time	$t_{d(on)}$	-	10	-	ns	$V_{GS}=0/18V, V_{DD}=400V,$ $R_G=15\Omega, I_D=33A$
Rise time	t_r	-	22	-		
Turn-off delay time	$t_{d(off)}$	-	37	-		
Fall time	t_f	-	17	-		
Gate resistance	R_G	-	2.1	-	Ω	$V_{GS}=0V, f=1MHz$

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Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	3.2	-	V	$V_{GS}=0V, I_{SD}=16.5A$ $T_j=25^{\circ}C$
		-	2.9	-		$T_j=175^{\circ}C$
Body Diode Continuous Forward Current	I_S	-	-	57	A	$T_C = 25^{\circ}C$
		-	-	40	A	$T_C = 100^{\circ}C$
Body Diode Reverse Recovery Time	t_{rr}	-	14	-	ns	$V_{GS}=0V, I_{SD}=33A,$ $V_R=400V$ $di/dt=1000A/\mu s$
Body Diode Reverse Recovery Charge	Q_{rr}	-	73	-	nC	
Peak Reverse Recovery Current	I_{RRM}	-	8.6	-	A	

Typical Performance Characteristics

Fig 1: Output Characteristics $T_j=25^\circ\text{C}$

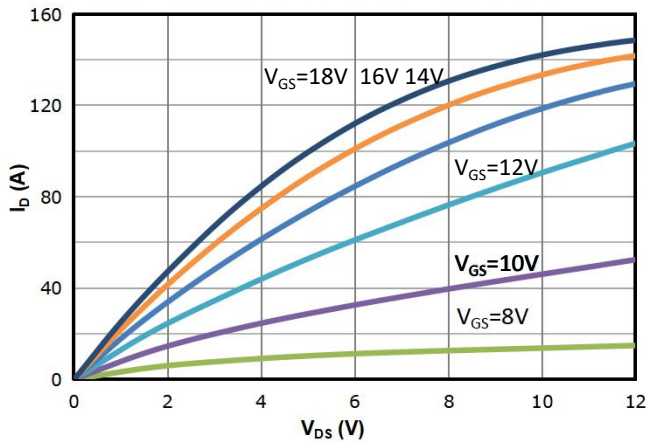


Fig 2: Output Characteristics $T_j=175^\circ\text{C}$

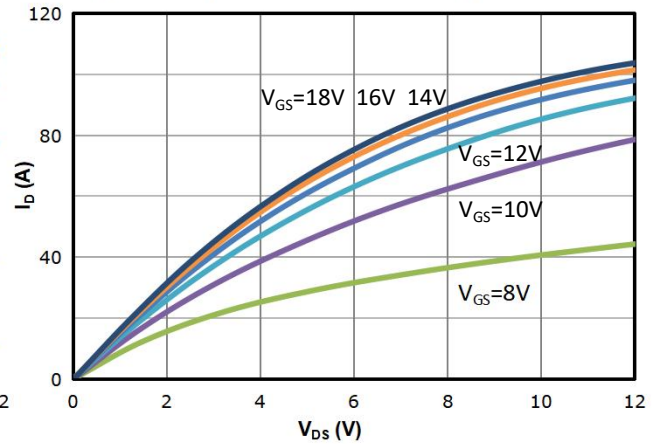


Fig 3: Transfer Characteristics

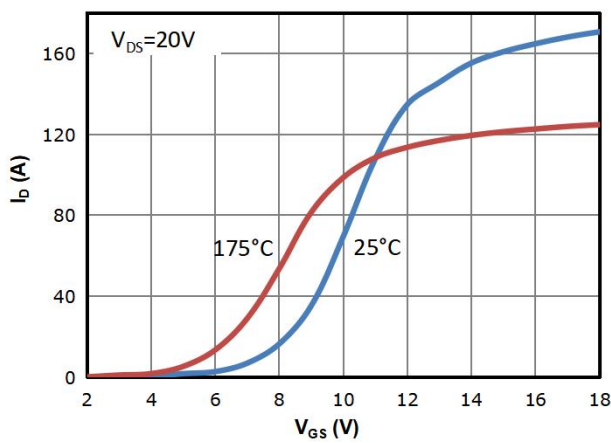


Fig 4: $R_{DS(on)}$ vs Drain Current and Gate Voltage

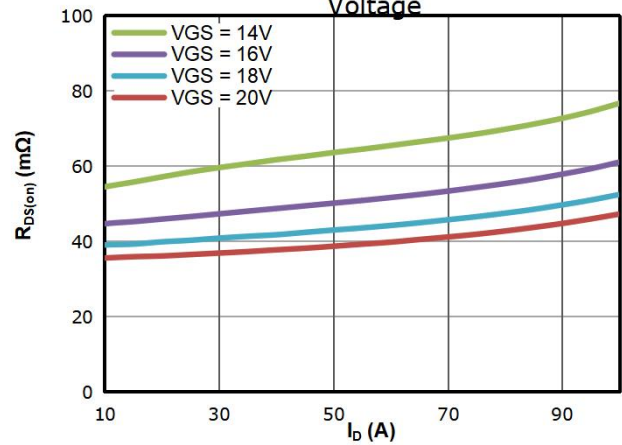


Fig 5: $R_{DS(on)}$ vs. Temperature

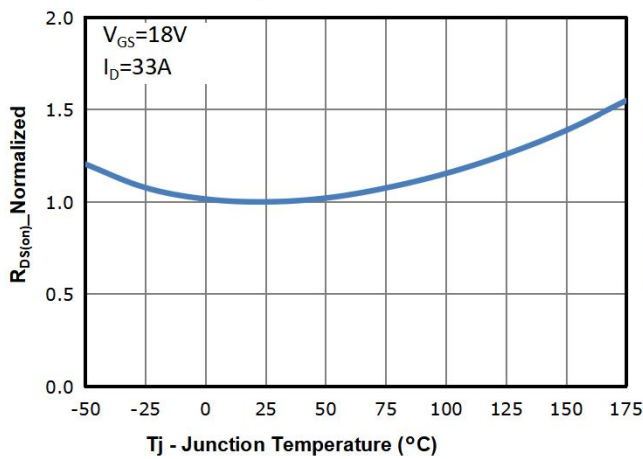


Fig 6: $V_{GS(th)}$ vs. Temperature

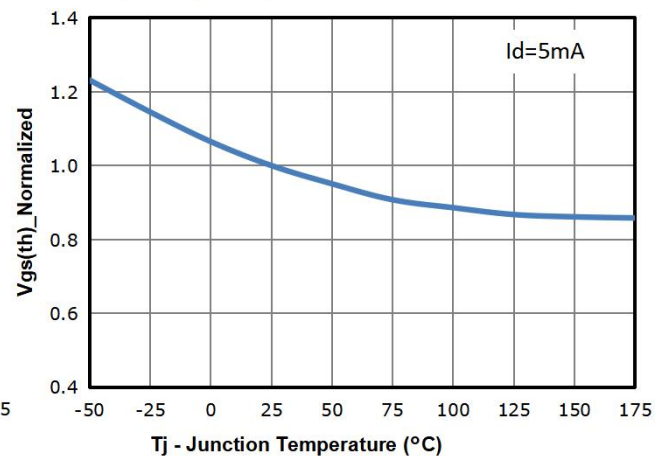


Fig 7: BVdss vs. Temperature

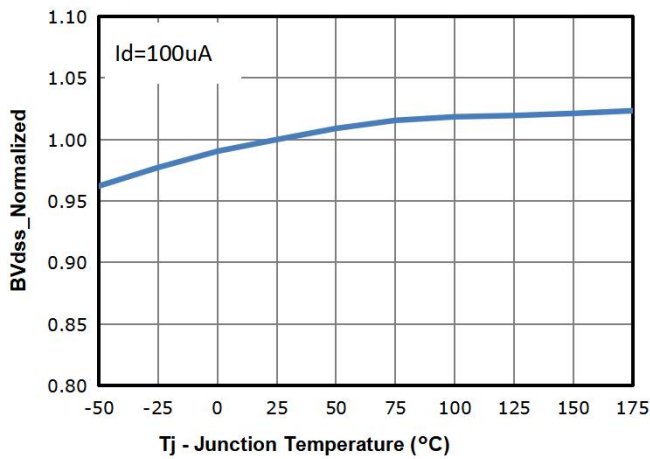


Fig 8: Capacitance Characteristics

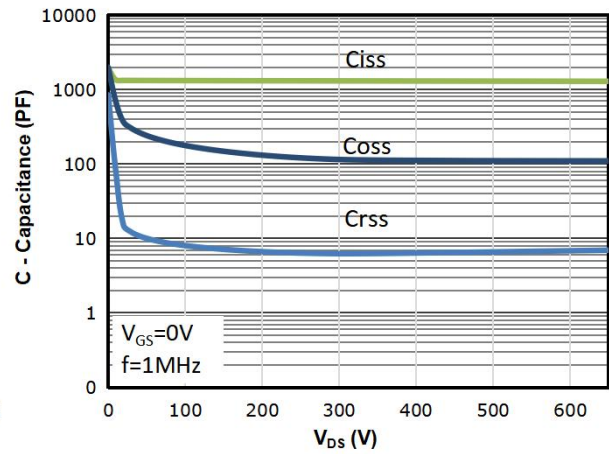


Fig 9: Gate Charge Characteristics

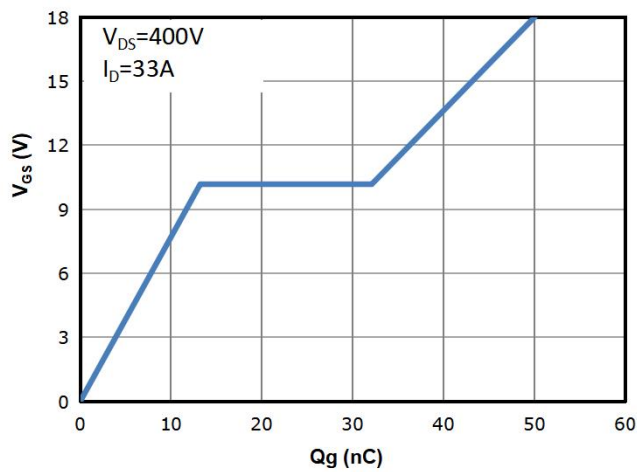


Fig 10: Body-diode Forward Characteristics

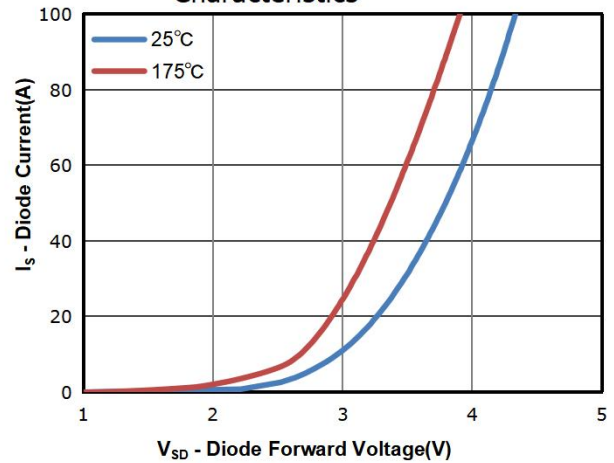


Fig 11: Power Dissipation

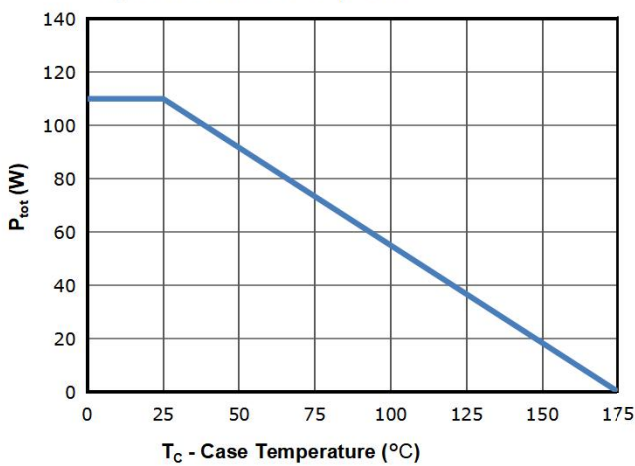
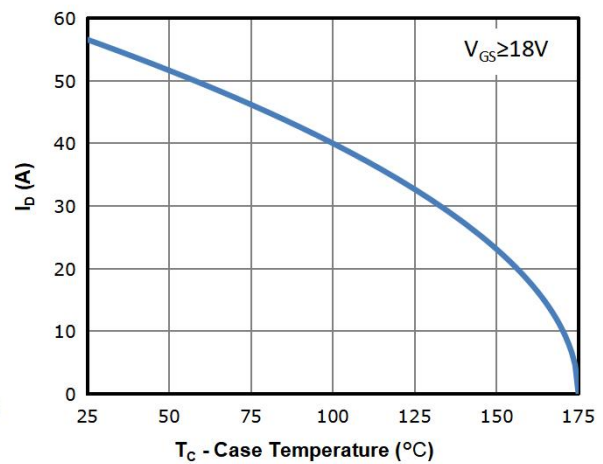


Fig 12: Drain Current Derating



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Fig 13: Safe Operating Area

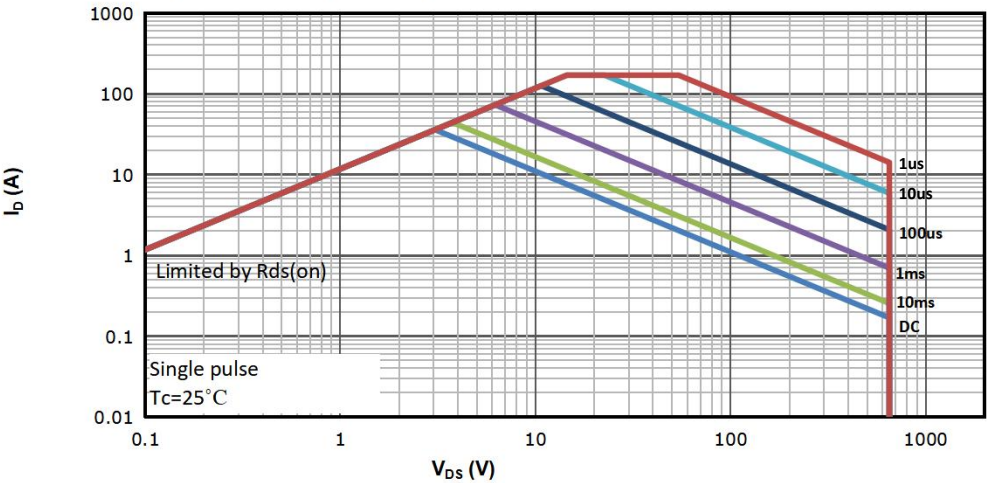
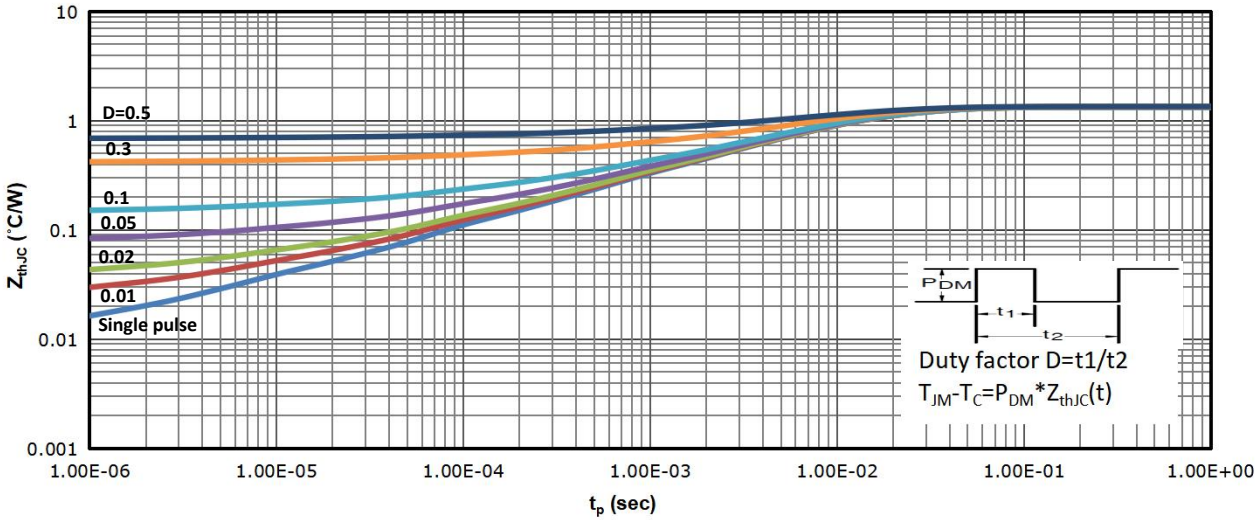
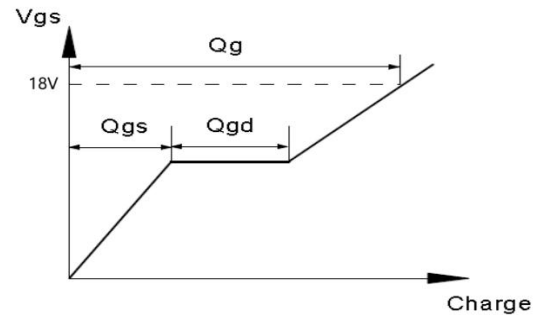
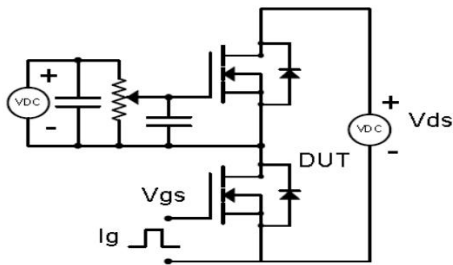


Fig 14: Max. Transient Thermal Impedance

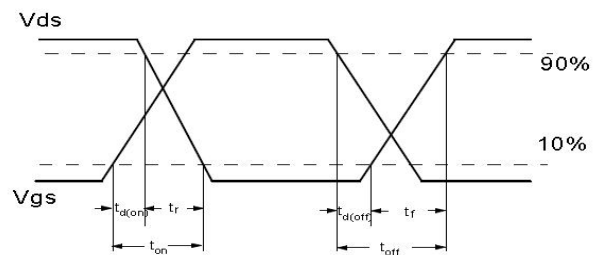
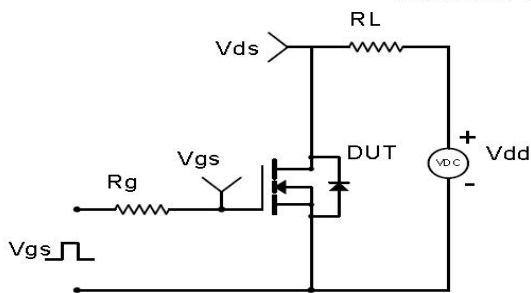


Test Circuit & Waveform

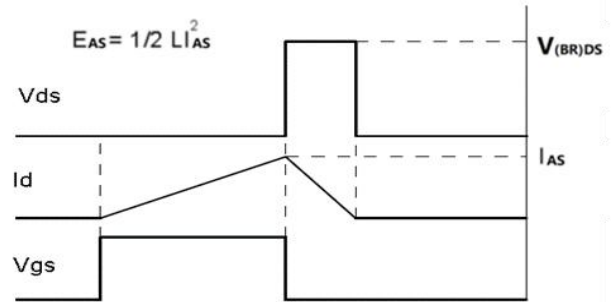
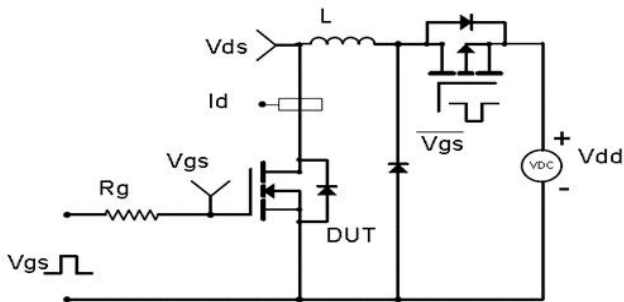
Gate Charge Test Circuit & Waveform



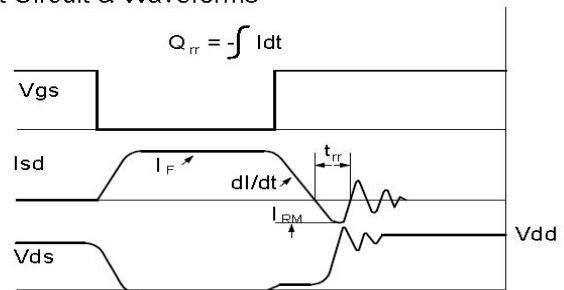
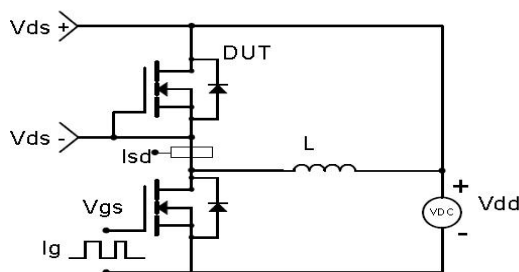
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



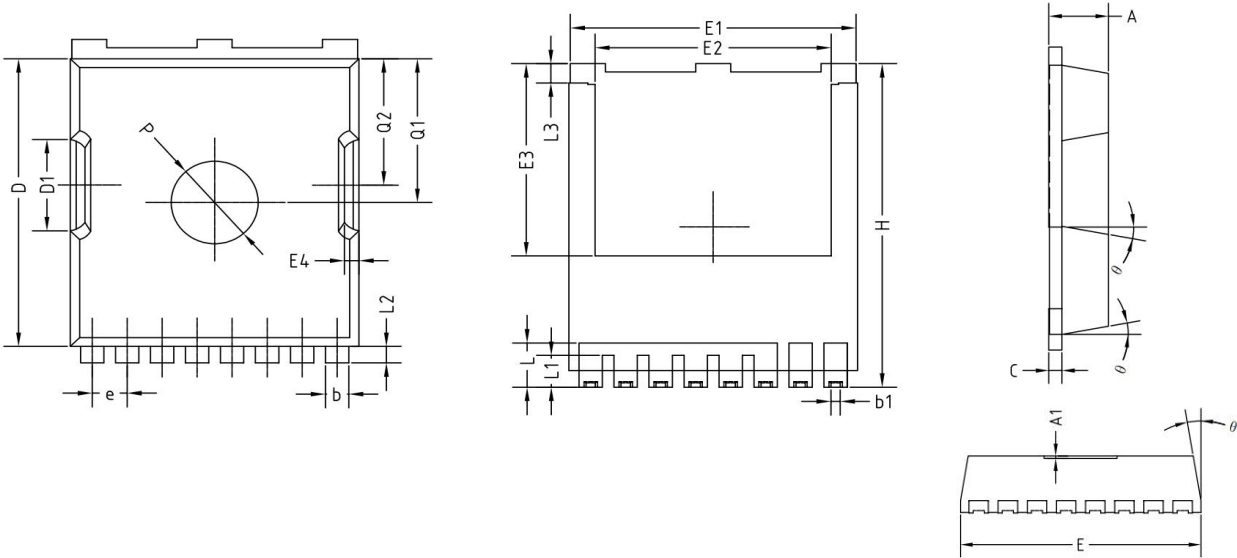
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Package Outline: TOLL-2L



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

Disclaimer

Any and all semiconductor products have certain probability to fail or malfunction, which may result in personal injury, death or property damage. Customer are solely responsible for providing adequate safe measures when design their systems.

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