

SC065N65TK-R

Silicon Carbide MOSFET 650V, 65mΩ, 38A



重庆平伟半导体股份有限公司

Features

- Low switching losses
- Extremely low on-resistance $R_{DS(on)}$
- Robust body diode operation under hard commutation events
- Easy to Parallel and Simple to Drive
- Qualified according to JEDEC criteria

Applications

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

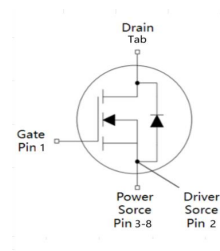
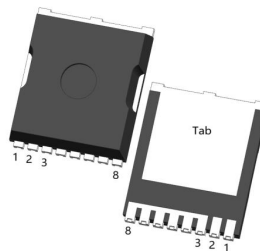


100% DVDS Tested
100% Avalanche Tested

Product Summary

V_{DS}	650V
$R_{DS(on)}$ typ.	65mΩ
I_D	38A

TOLL-2L



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
SC065N65TK-R	SC065N65TK	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	38 27	A
Pulsed drain current ($T_C = 25^\circ\text{C}$)	$I_{D \text{ pulse}}$	114	A
Avalanche energy, single pulse ($L=5\text{mH}$)	E_{AS}	114	mJ
Gate-Source voltage,max.transient voltage	V_{GSmax}	-10/+22	V
Recommended operating values	V_{GSsop}	-5/+18	V
Power dissipation $T_C = 25^\circ\text{C}$	P_{tot}	133	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}	-	0.75	1.1	°C/W	-
Thermal resistance, junction - ambient(min. footprint)	R_{thJA}	-	-	40	°C/W	1 inch ² , 2oz single copper FR-4 PCB.

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	$V_{GS(th)}$	2.2	3.4	4.2	V	$V_{DS}=V_{GS}, I_D=5mA$
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	$V_{GS}=-10V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	65	75	mΩ	$V_{GS}=18V, I_D=20A$
Transconductance	g_{fs}	-	13	-	S	$V_{DS}=20V, I_D=20A$

Dynamic Characteristic

Input Capacitance	C_{iss}	-	960	-	pF	$V_{GS}=0V, V_{DS}=400V,$ $f=1MHz$
Output Capacitance	C_{oss}	-	70	-		
Reverse Transfer Capacitance	C_{rss}	-	5	-		
Gate Total Charge	Q_G	-	43	-	nC	$V_{DS}=800V, I_D=20A$ $V_{GS}=-5V/18V$
Gate-Source charge	Q_{gs}	-	18	-		
Gate-Drain charge	Q_{gd}	-	12	-		
Turn-on delay time	$t_{d(on)}$	-	6.4	-	ns	$V_{GS}=-5/18V,$ $V_{DD}=400V,$ $R_G=10\Omega, I_D=20A$
Rise time	t_r	-	12	-		
Turn-off delay time	$t_{d(off)}$	-	20	-		
Fall time	t_f	-	6.4	-		
Gate resistance	R_G	-	4.2	-	Ω	$V_{GS}=0V, f=1MHz$

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	3.5	-	V	$V_{GS} = -5V, I_{SD} = 10A$ $T_j = 25^{\circ}C$
		-	3.2	-		$T_j = 175^{\circ}C$
Body Diode Continuous Forward Current	I_S	-	-	41	A	$T_C = 25^{\circ}C$
		-	-	23	A	$T_C = 100^{\circ}C$
Body Diode Reverse Recovery Time	t_{rr}	-	11	-	ns	$V_{GS} = -5V, I_{SD} = 20A,$ $V_R = 400V$ $di/dt = 1200A/us$
Body Diode Reverse Recovery Charge	Q_{rr}	-	67	-	nC	
Peak Reverse Recovery Current	I_{RRM}	-	10	-	A	

Typical Performance Characteristics

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

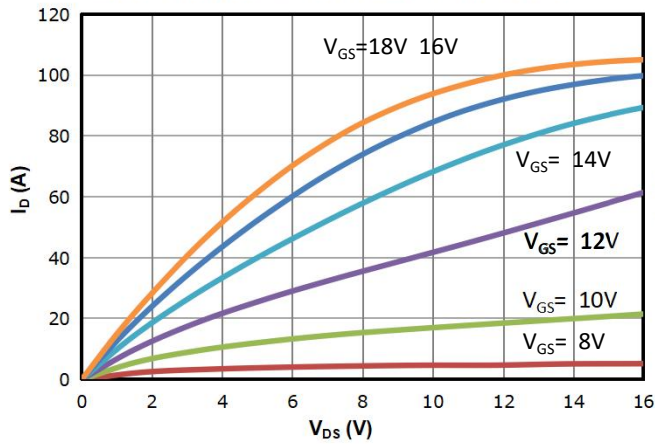


Fig 2: Output Characteristics $T_j=175^\circ\text{C}$

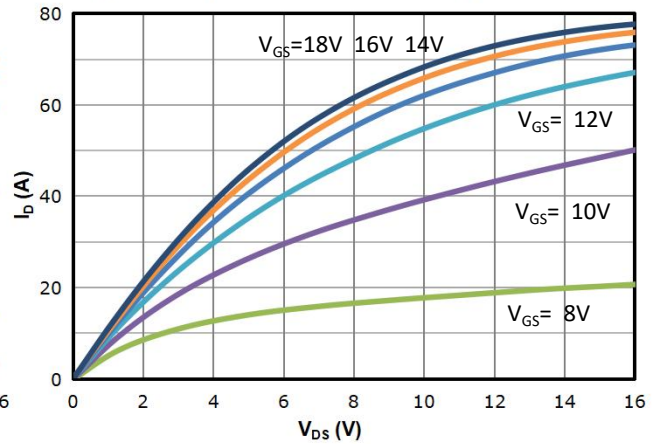


Fig 3: Transfer Characteristics

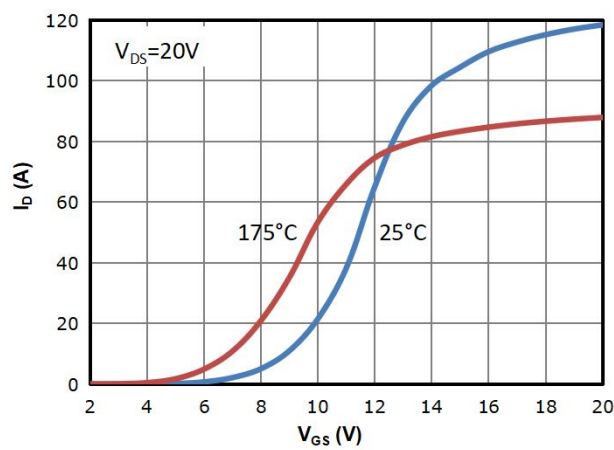


Fig 4: $R_{ds(on)}$ vs Drain Current and Gate Voltage

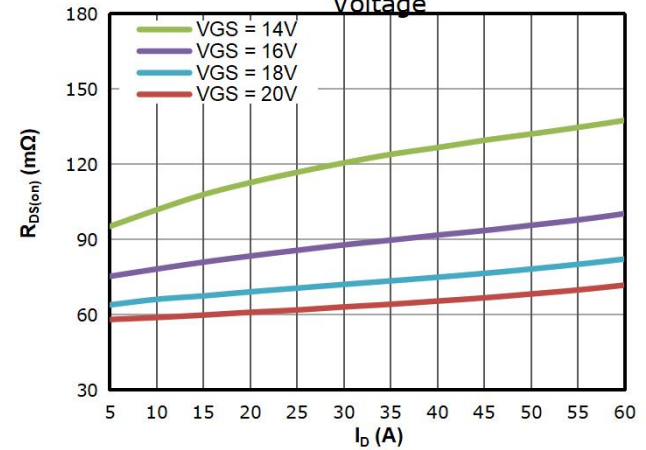


Fig 5: $R_{ds(on)}$ vs. Temperature

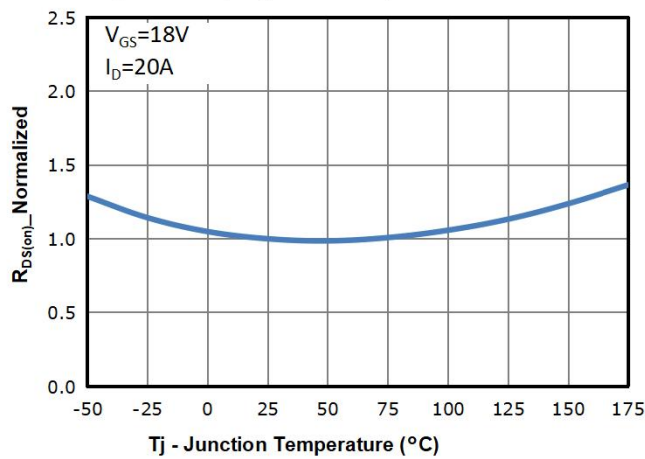


Fig 6: $V_{gs(th)}$ vs. Temperature

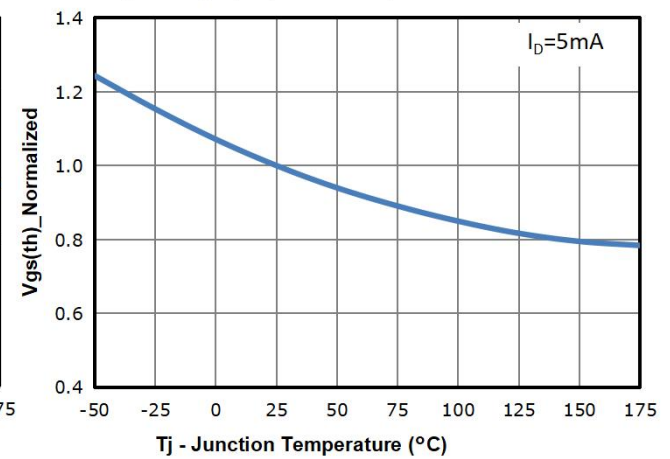


Fig 7: BVdss vs. Temperature

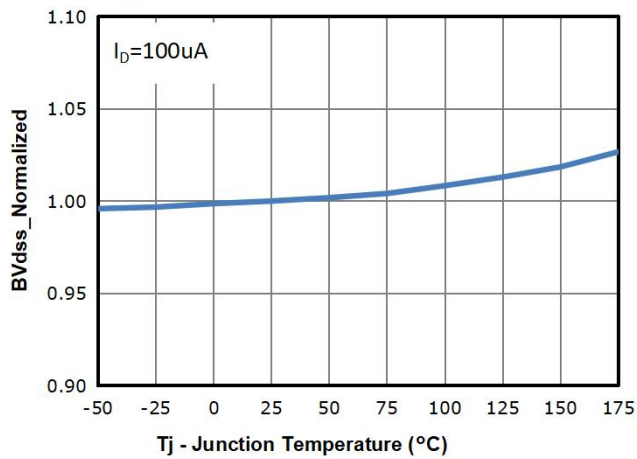


Fig 8: Capacitance Characteristics

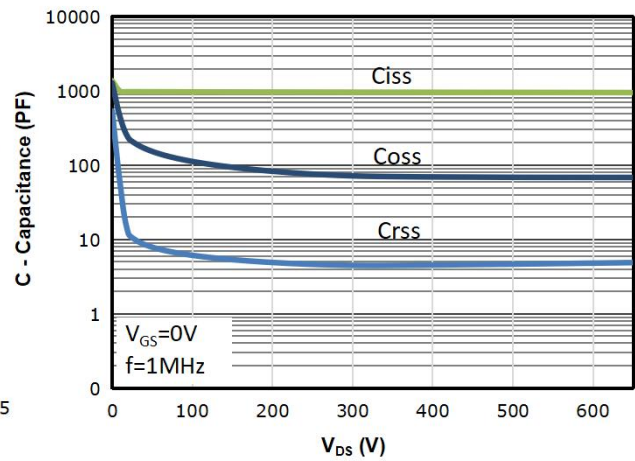


Fig 9: Gate Charge Characteristics

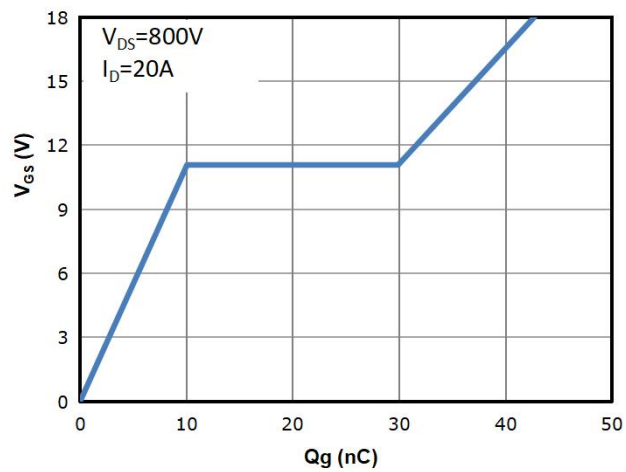


Fig 10: Body-diode Forward Characteristics

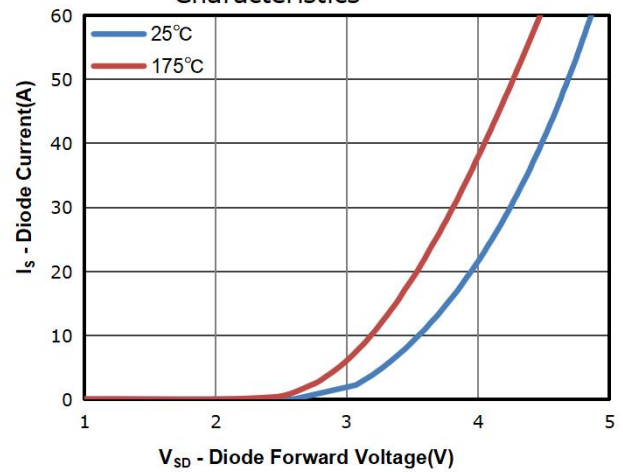


Fig 11: Power Dissipation

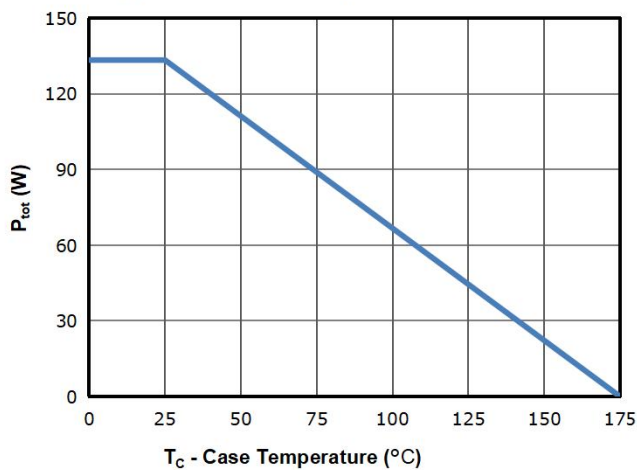


Fig 12: Drain Current Derating

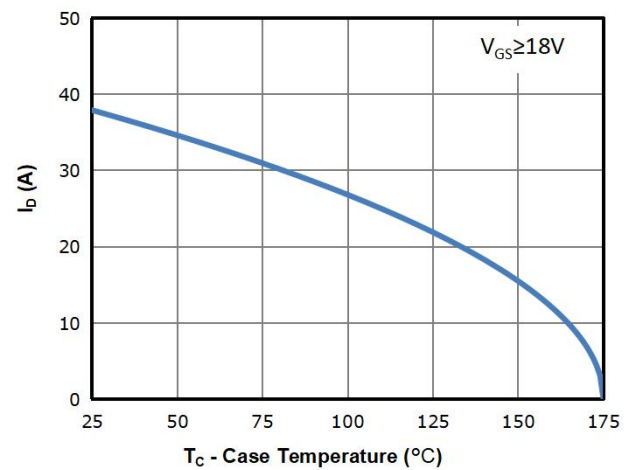




Fig 13: Safe Operating Area

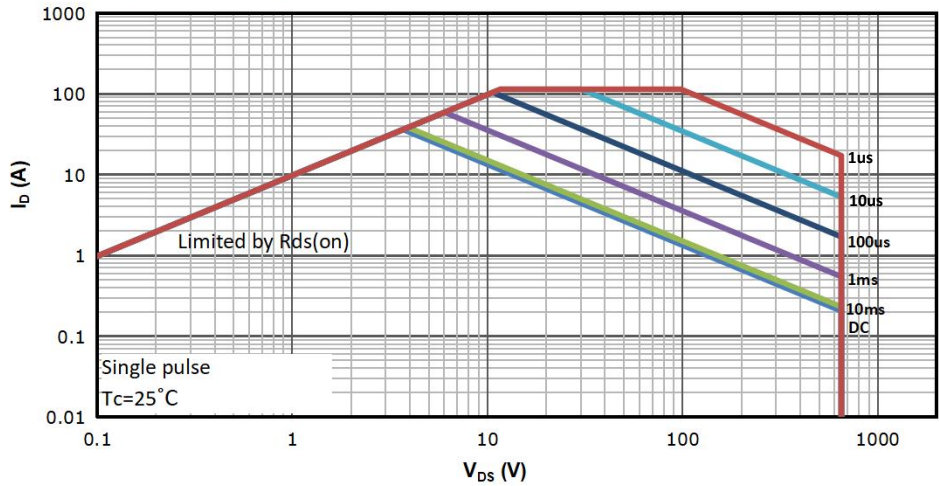
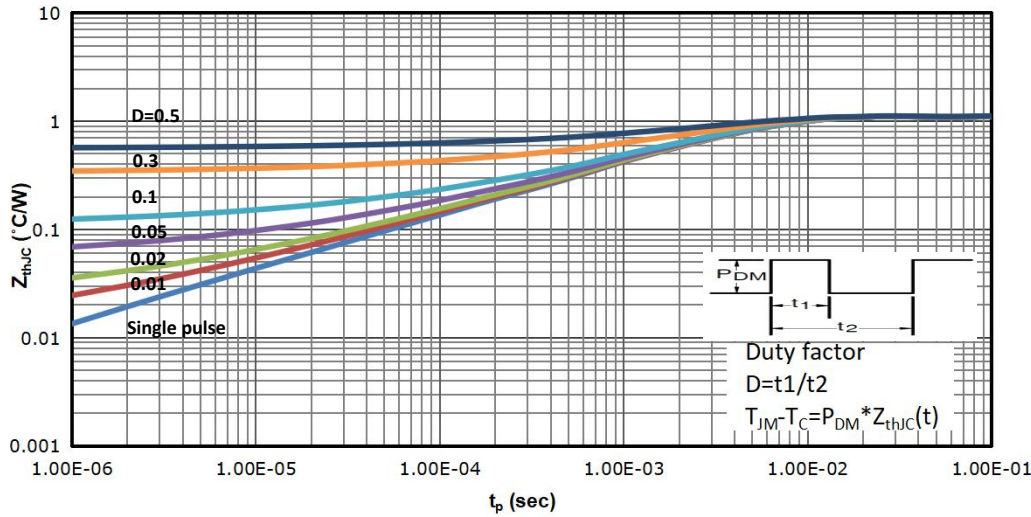
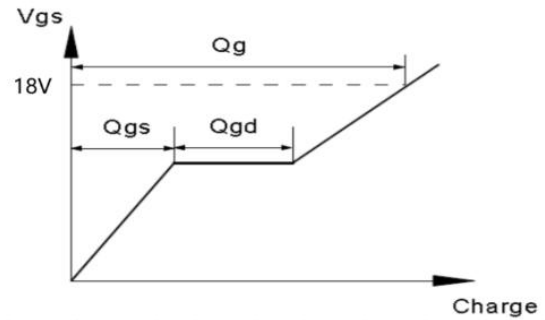
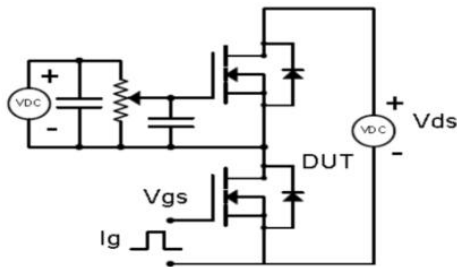


Fig 14: Max. Transient Thermal Impedance

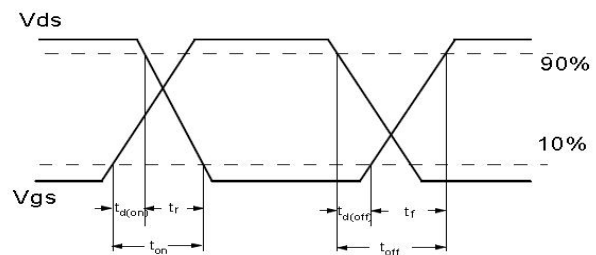
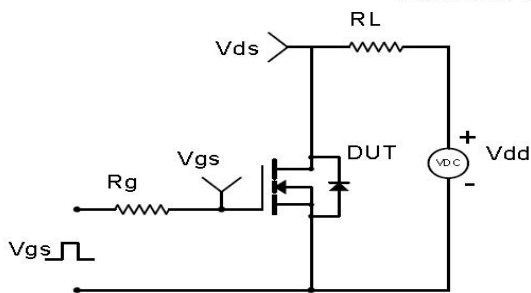


Test Circuit & Waveform

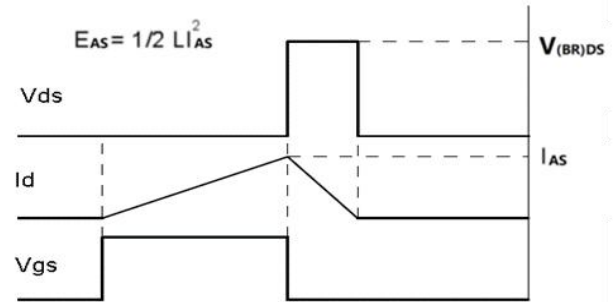
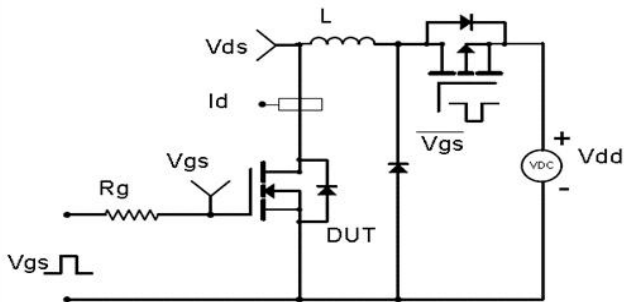
Gate Charge Test Circuit & Waveform



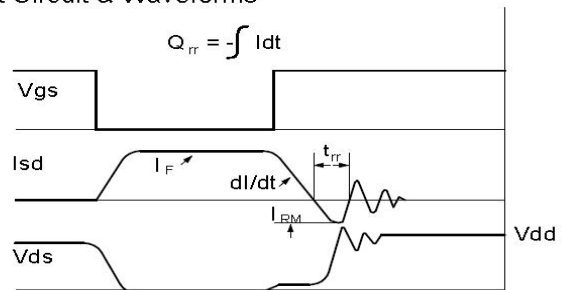
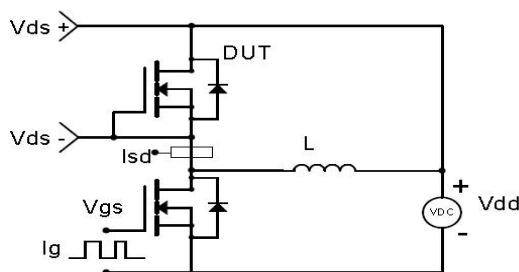
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



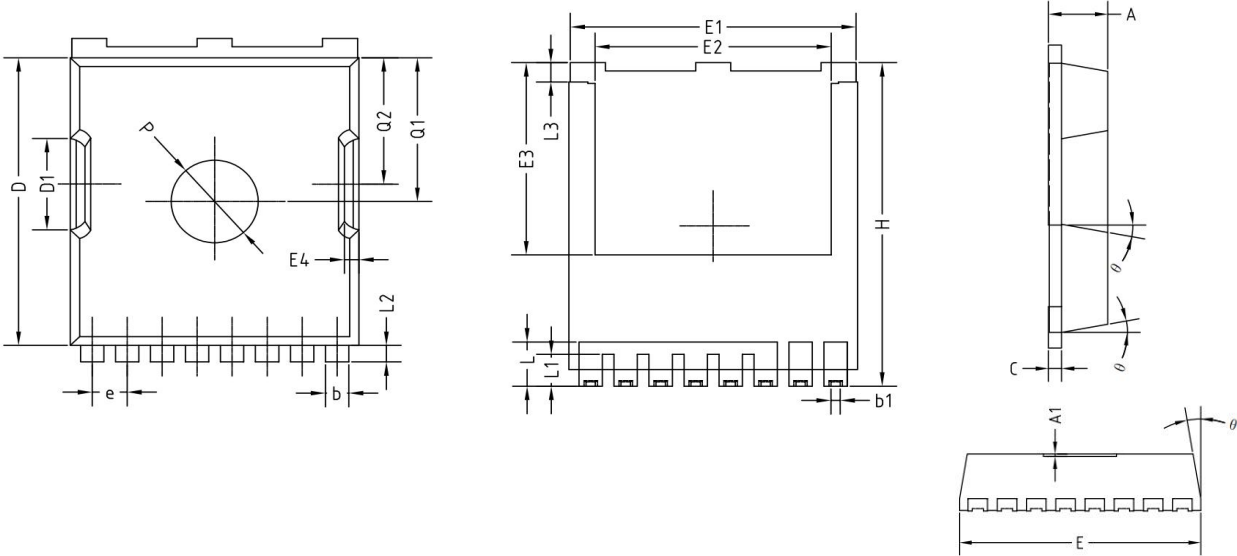
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Package Outline: TOLL-2L



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

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