

SC045N65LTK-R

Silicon Carbide MOSFET 650V, 45mΩ, 55A



重庆平伟实业股份有限公司

Features

- Low switching losses
- Extremely low on-resistance $R_{DS(on)}$
- Robust body diode operation under hard commutation events
- .XT interconnection technology for best-in-class thermal performance
- Qualified according to JEDEC criteria

Applications

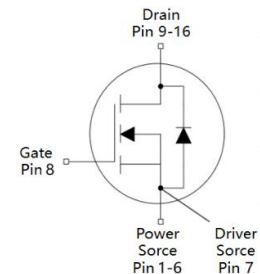
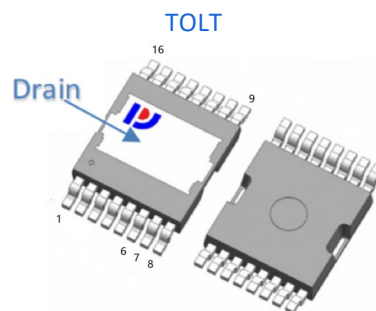
- SMPS
- Solar PV inverters
- UPS
- EV charging infrastructure
- Energy storage and battery formation



100% DVDS Tested
100% Avalanche Tested

Product Summary

V_{DS}	650V
$R_{DS(on)}$ typ.	45mΩ
I_D	55A



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
SC045N65LTK-R	SC045N65LTK	TOLT	Tape&Reel	13 inches	24mm	1000pcs

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	55 39	A
Pulsed drain current ($T_C = 25^\circ\text{C}$)	$I_{D \text{ pulse}}$	221	A
Avalanche energy, single pulse ($L=0.5\text{mH}$)	E_{AS}	105	mJ
Gate-Source voltage,max.transient voltage	V_{GSmax}	-10/+22	V
Gate-Source voltage,max.static voltage	V_{GSsop}	-5/+18	V
Power dissipation $T_C = 25^\circ\text{C}$	P_{tot}	127	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.	RthJC	-	0.8	1.2	°C/W	-
Thermal resistance, junction - ambient(min. footprint)	RthJA	-	-	59.3	°C/W	-

Electrical Characteristic (at T_j = 25 °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 =1mA
Gate threshold voltage	V _{GS(th)}	2.2	3.2	4.2	V	V _{DS} =V _{GS} , I _D =5mA
Zero gate voltage drain current	I _{DSS}	-	0.5	10	μA	V _{DS} =650V, V _{GS} =0V T _j =25°C T _j =175°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)}	-	45	55	mΩ	V _{GS} =18V, I _D =20A
Transconductance	g _{fs}	-	13	-	S	V _{DS} =20V, I _D =15A

Dynamic Characteristic

Input Capacitance	C _{iss}	-	1611	-	pF	V _{GS} =0V, V _{DS} =400V, f=1MHz
Output Capacitance	C _{oss}	-	107	-		
Reverse Transfer Capacitance	C _{rss}	-	9	-		
Gate Total Charge	Q _G	-	70	-	nC	V _{DS} =400V, I _D =20A , V _{GS} =-5/18V
Gate-Source charge	Q _{gs}	-	29	-		
Gate-Drain charge	Q _{gd}	-	16	-		
Turn-on delay time	t _{d(on)}	-	8	-	ns	V _{GS} =-5/18V, V _{DD} =400V, R _G =15Ω, I _D =20A
Rise time	t _r	-	20	-		
Turn-off delay time	t _{d(off)}	-	35	-		
Fall time	t _f	-	15	-		
Gate resistance	R _G	-	4.1	-	Ω	V _{GS} =0V, f=1MHz

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	- -	3.4 3.1	- -	V	$V_{GS} = -5V, I_{SD} = 10A$ $T_j = 25^{\circ}C$ $T_j = 175^{\circ}C$
Body Diode Continuous Forward Current	I_S	-	-	64	A	TC = 25°C
		-	-	36	A	TC = 100°C
Body Diode Reverse Recovery Time	t_{rr}	-	14	-	ns	$V_{GS} = -5V, I_{SD} = 20A,$ $V_R = 400V$ $di/dt = 1000A/\mu s$
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 $T_j=25^{\circ}\text{C}$

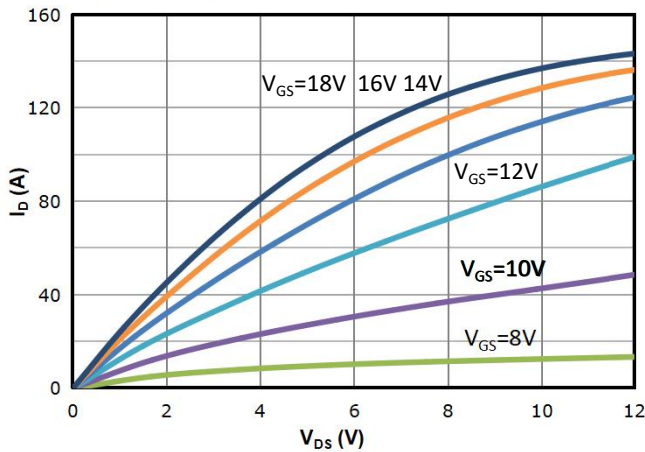


Fig 2: Output Characteristics $T_j=175^{\circ}\text{C}$

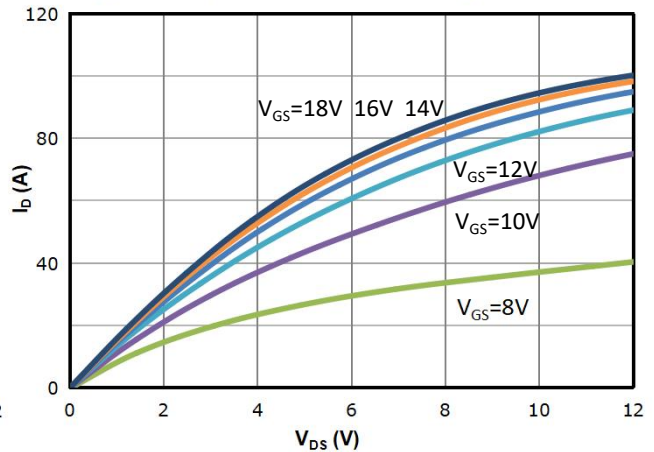


Fig 3: Transfer Characteristics

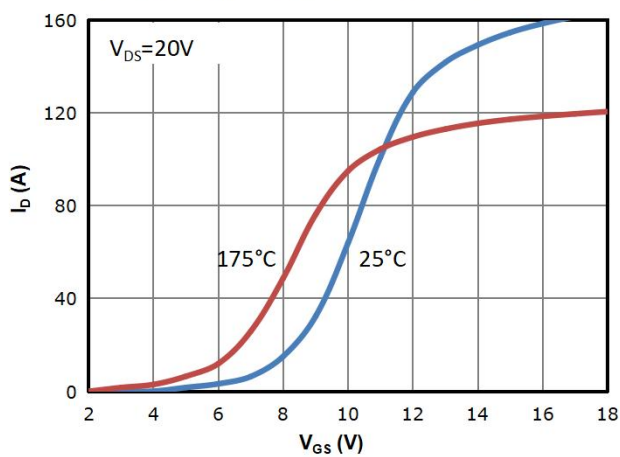


Fig 4: $R_{DS(on)}$ vs Drain Current and Gate Voltage

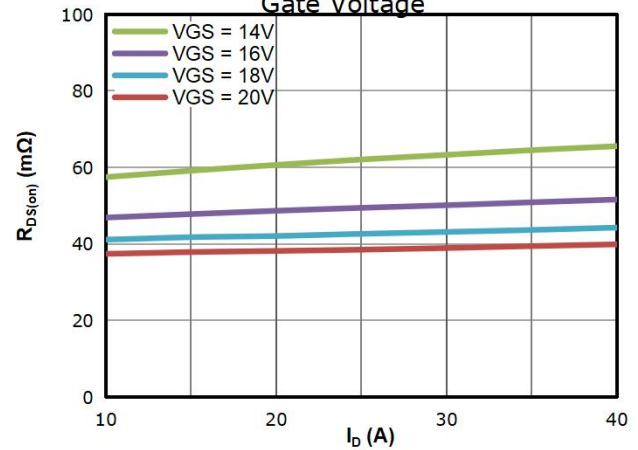


Fig 5: $R_{DS(on)}$ vs. Temperature

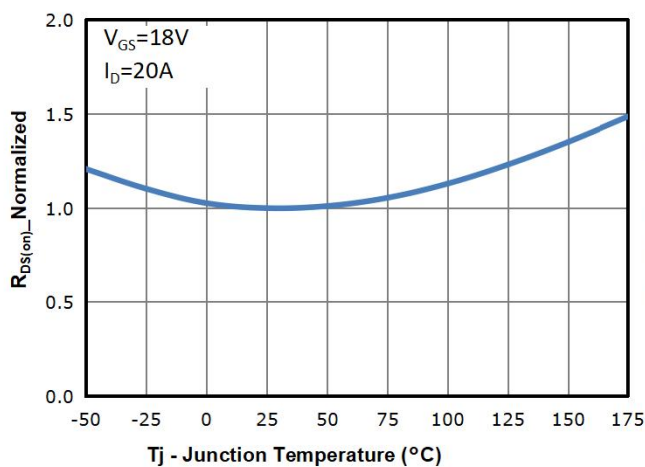


Fig 6: $V_{GS(th)}$ vs. Temperature

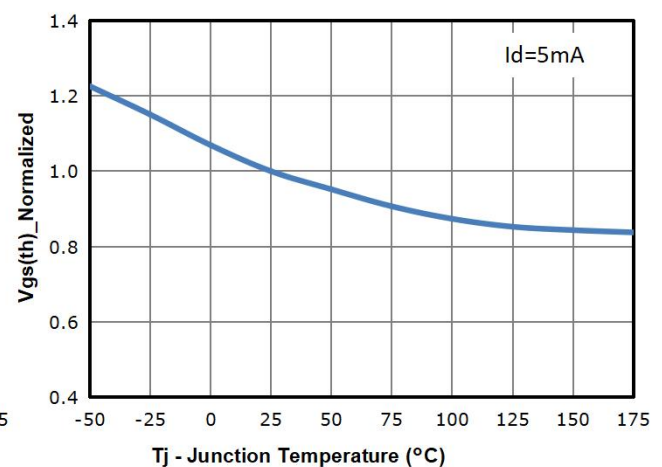


Fig 7: BVdss vs. Temperature

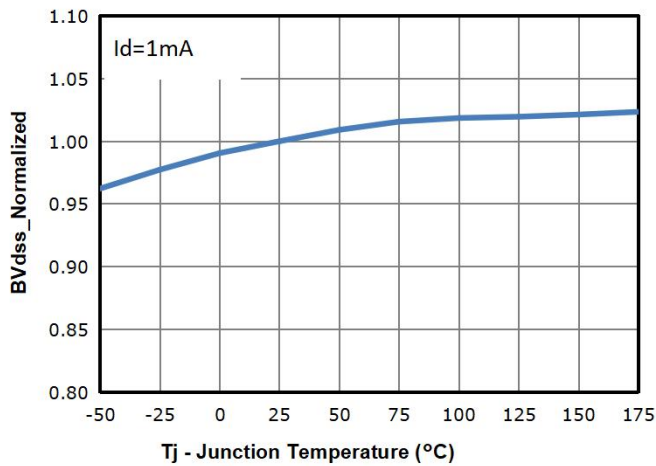


Fig 8: Capacitance Characteristics

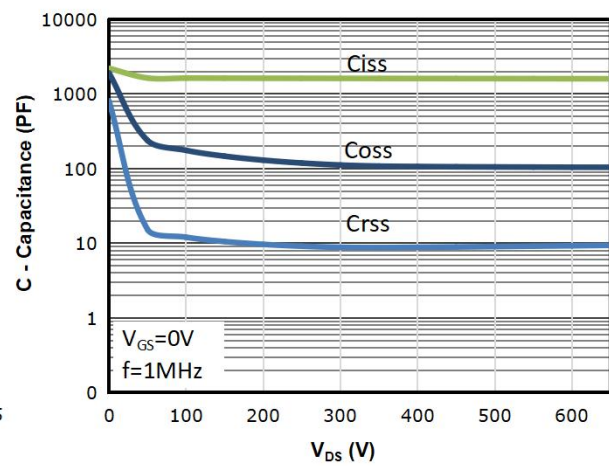


Fig 9: Gate Charge Characteristics

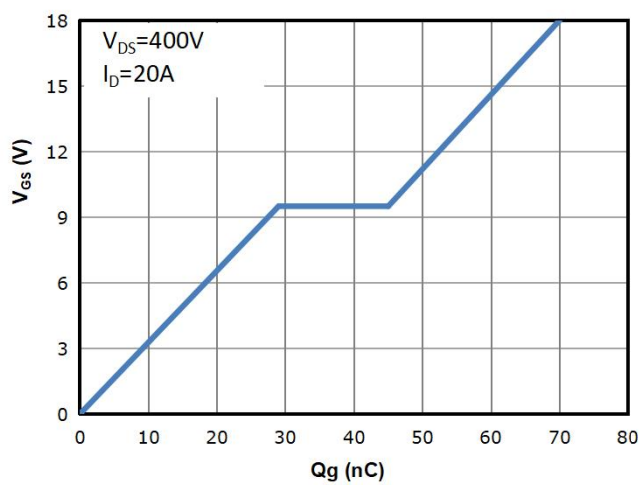


Fig 10: Body-diode Forward Characteristics

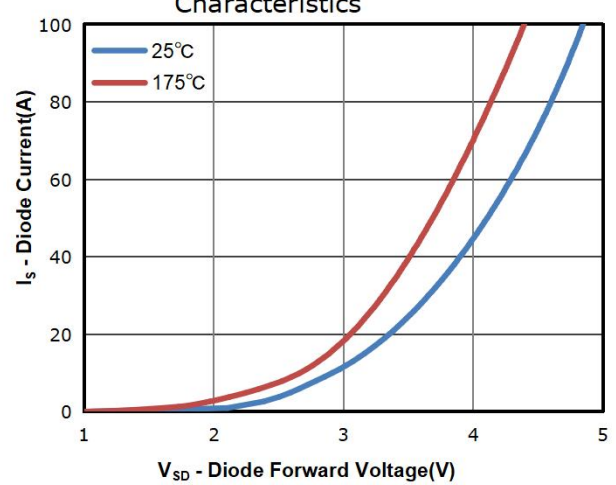


Fig 11: Power Dissipation

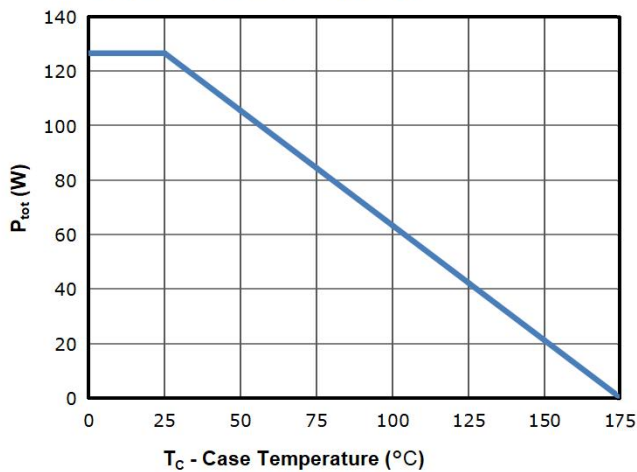


Fig 12: Drain Current Derating

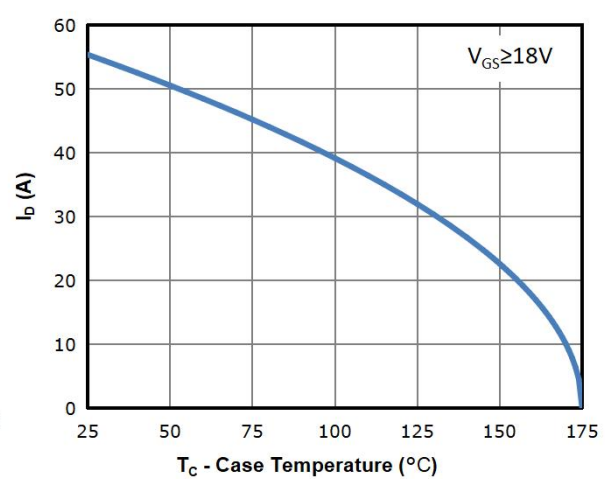


Fig 13: Safe Operating Area

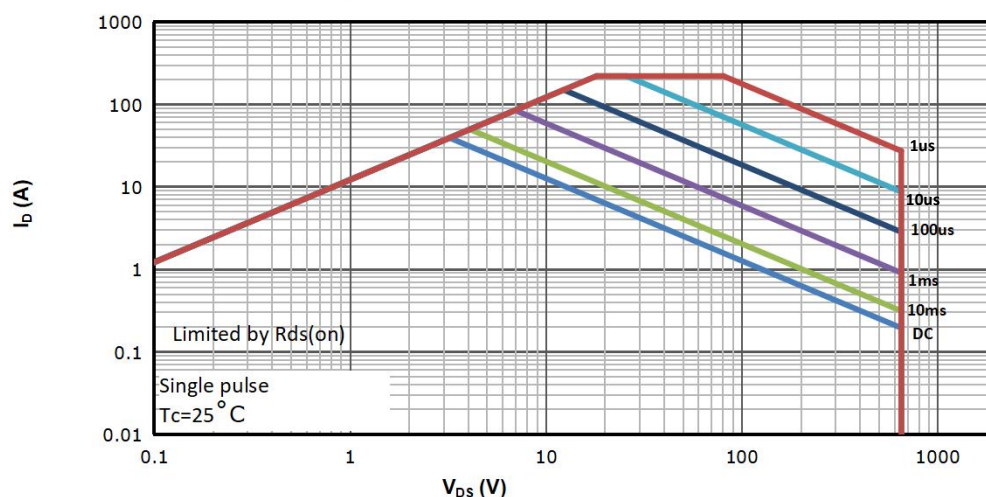
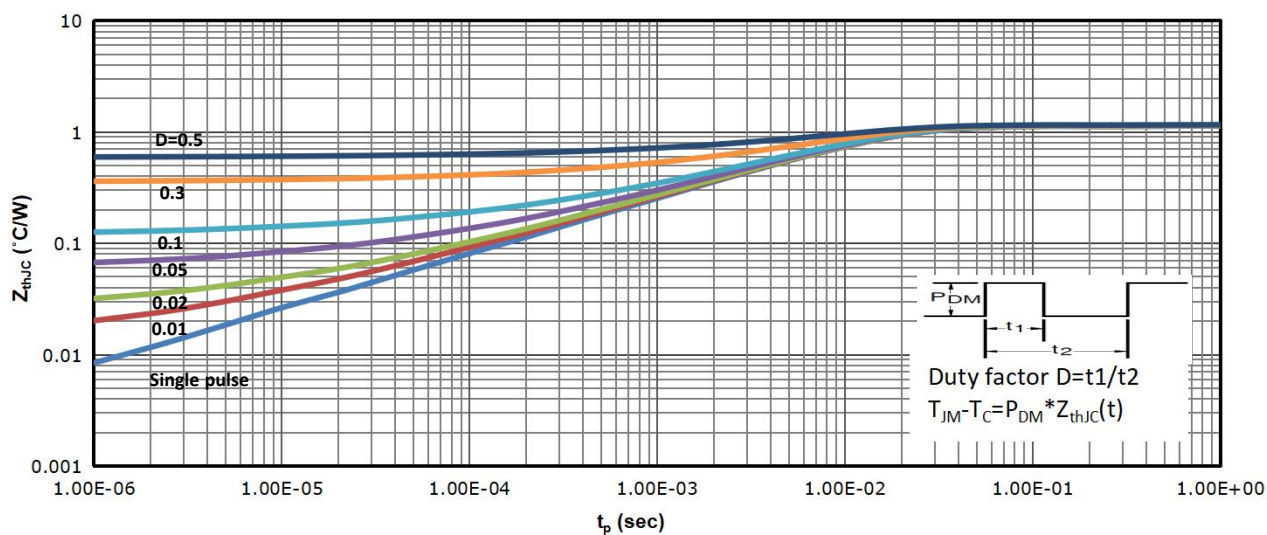
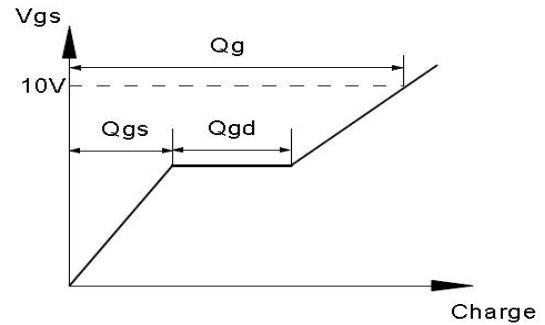
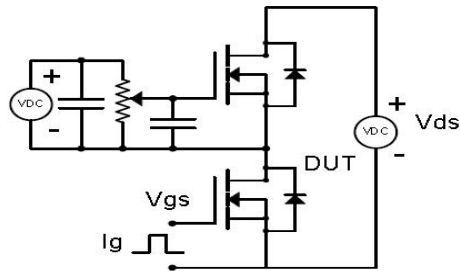


Fig 14: Max. Transient Thermal Impedance

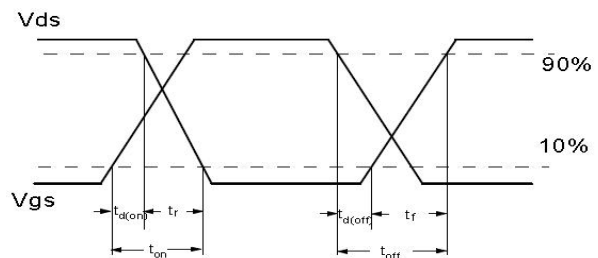
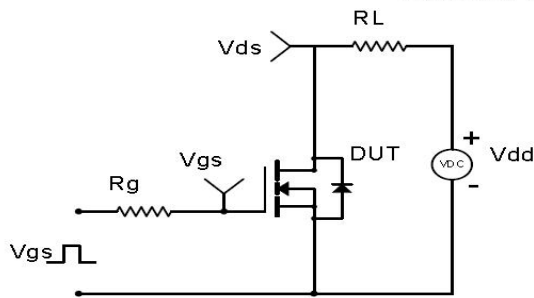


Test Circuit & Waveform

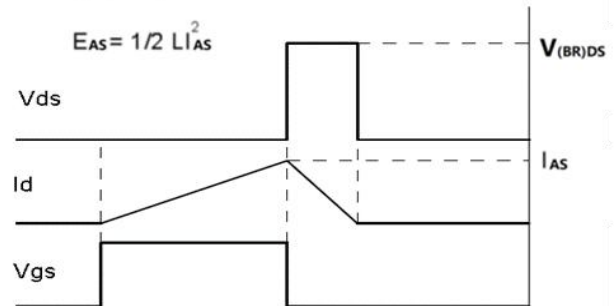
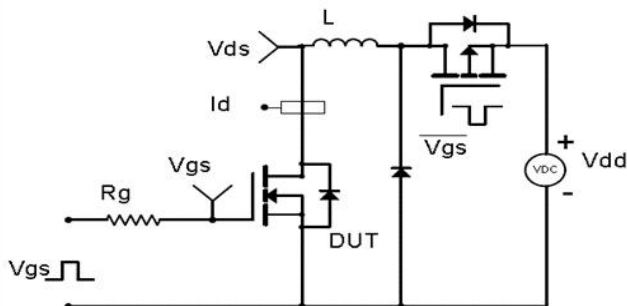
Gate Charge Test Circuit & Waveform



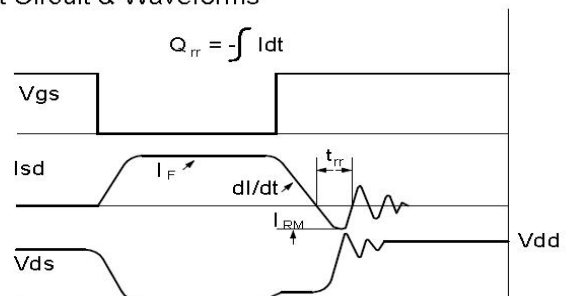
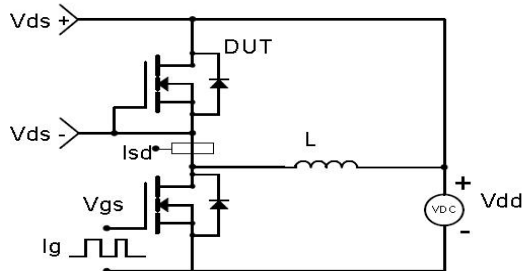
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

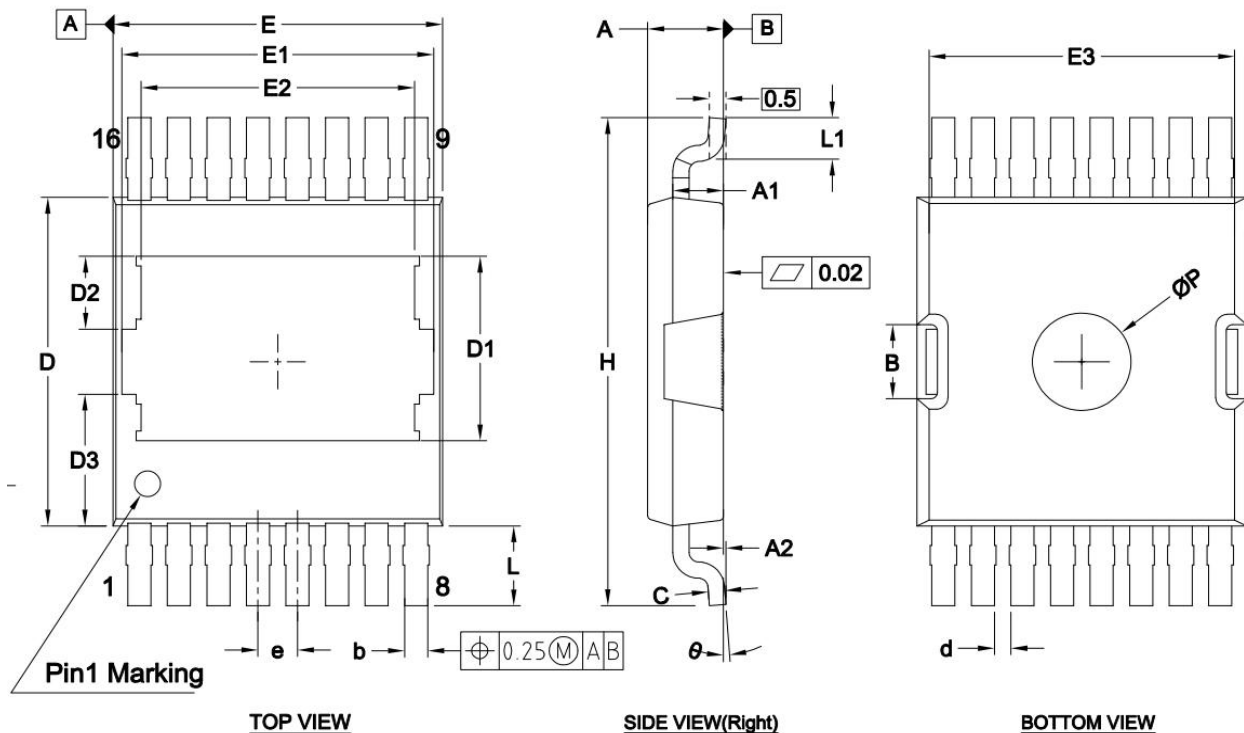


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Package Outline: TOLT



DIM SYMBOL	MIN.	NOM.	MAX.
A	2.250	2.300	2.350
A1	1.440	1.540	1.640
A2	0.010	---	0.160
b	0.600	0.700	0.800
c	0.400	0.500	0.600
d	0.400	0.500	0.600
e	1.200 BSC		
D	10.00	10.100	10.300
D1	5.470	5.670	5.870
D2	2.040	2.240	2.440
D3	4.050 REF.		
E	9.700	10.000	10.300
E1	9.460 REF.		
E2	8.100	8.300	8.500
E3	9.07	9.270	9.470
H	14.800	15.000	15.200
L	2.250	2.450	2.650
L1	1.350	1.500	1.650
ØP	2.850	3.000	3.150
B	2.080	2.280	2.480
θ	1°	3°	5°

Disclaimer

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