

SC020N65LTK-R

Silicon Carbide MOSFET 650V, 20mΩ, 90A



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

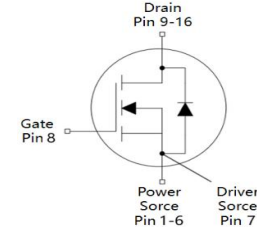
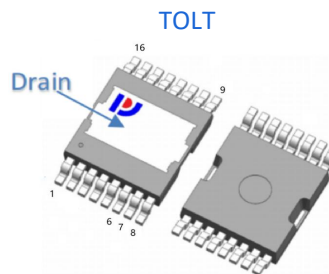
- On-board charger
- DC/DC converter
- Auxiliary inverters



100% DVDS Tested
100% Avalanche Tested

Product Summary

V_{DS}	650V
$R_{DS(on)}$ typ.	20mΩ
I_D	90A



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
SC020N65LTK-R	SC020N65LTK	TOLT	Tape&Reel	13 inches	24mm	1200

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	650	V
Continuous drain current $T_C = 25^\circ\text{C}$ $T_C = 25^\circ\text{C}$ (Package limit) $T_C = 100^\circ\text{C}$ (Silicon limit)	I_D	90 160 64	A
Pulsed drain current ($T_C = 25^\circ\text{C}$)	$I_{D \text{ pulse}}$	270	A
Avalanche energy, single pulse ($L=5\text{mH}$)	E_{AS}	423	mJ
Gate-Source voltage,max.transient voltage	V_{GSmax}	-10/+22	V
Gate-Source voltage,Recommended operating values	V_{GSsop}	-5/+18	V
Power dissipation $T_C = 25^\circ\text{C}$	P_{tot}	323	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}	-	-	0.47	°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	$V_{GS(th)}$	2.2	3.0	4.2	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}	-	-	100	nA	$V_{GS}=22V, V_{DS}=0V$
		-	-	-100	nA	$V_{GS}=-13V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	20	28	mΩ	$V_{GS}=18V, I_D=40A$
Transconductance	g_{fs}	-	10	-	S	$V_{DS}=18V, I_D=10A$

Dynamic Characteristic

Input Capacitance	C_{iss}	-	2977	-	pF	$V_{GS}=0V, V_{DS}=400V,$ $f=1MHz$
Output Capacitance	C_{oss}	-	186	-		
Reverse Transfer Capacitance	C_{rss}	-	9	-		
Gate Total Charge	Q_G	-	131	-	nC	$V_{DS}=400V, I_D=20A$ $V_{GS}=-5V/18V$
Gate-Source charge	Q_{gs}	-	49	-		
Gate-Drain charge	Q_{gd}	-	28	-		
Turn-on delay time	$t_{d(on)}$	-	15	-	ns	$V_{GS}=-5/18V,$ $V_{DD}=400V,$ $R_G=5\Omega, I_D=20A$
Rise time	t_r	-	45	-		
Turn-off delay time	$t_{d(off)}$	-	13	-		
Fall time	t_f	-	10	-		
Gate resistance	R_G	-	1.5	-	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	$V_{GS} = -5V, I_{SD} = 20A$ $T_j = 25^{\circ}C$ $T_j = 175^{\circ}C$
Body Diode Continuous Forward Current	I_S	-	-	86	A	$T_C = 25^{\circ}C$
		-	-	48	A	$T_C = 100^{\circ}C$
Body Diode Reverse Recovery Time	t_{rr}	-	17	-	ns	$V_{GS} = -5V, I_{SD} = 20A,$ $V_R = 400V$ $di/dt = 1200A/us$
Body Diode Reverse Recovery Charge	Q_{rr}	-	112	-	nC	
Peak Reverse Recovery Current	I_{RRM}	-	11	-	A	

Typical Performance Characteristics

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

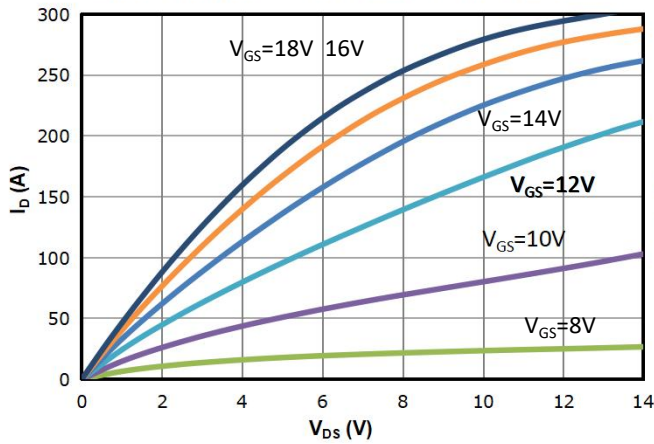


Fig 2: Output Characteristics $T_j=175^\circ\text{C}$

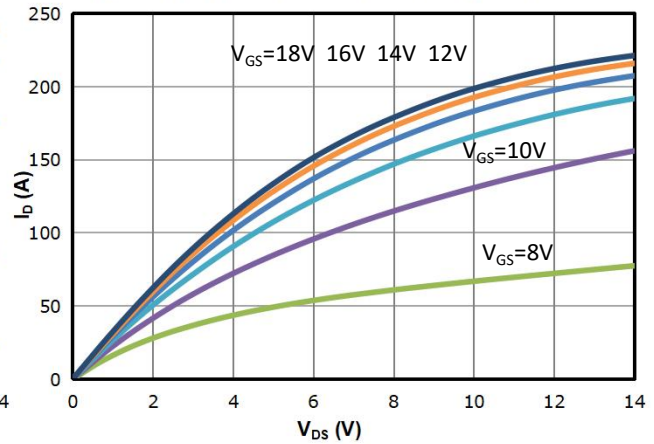


Fig 3: Transfer Characteristics

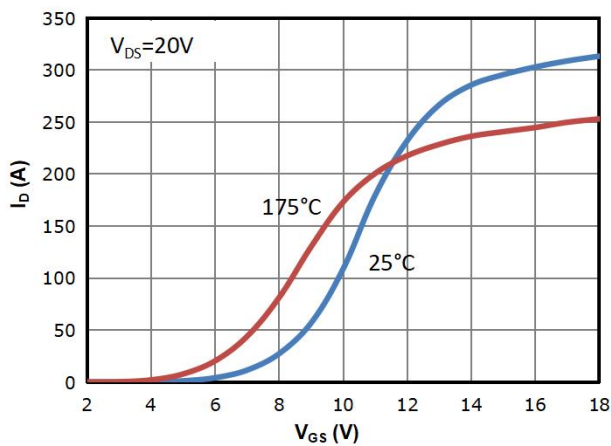


Fig 4: $R_{DS(on)}$ vs Drain Current and Gate Voltage

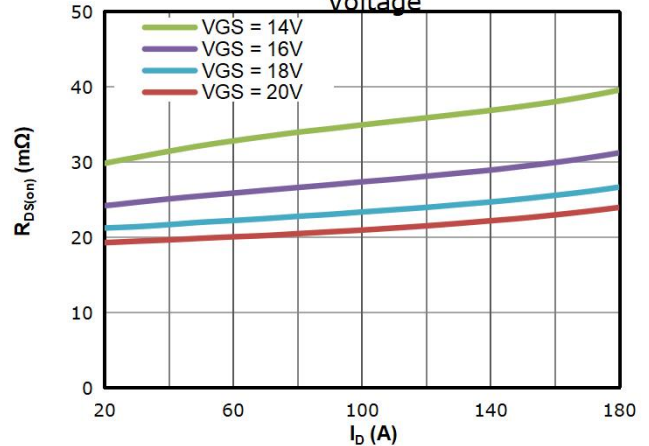


Fig 5: $R_{DS(on)}$ vs. Temperature

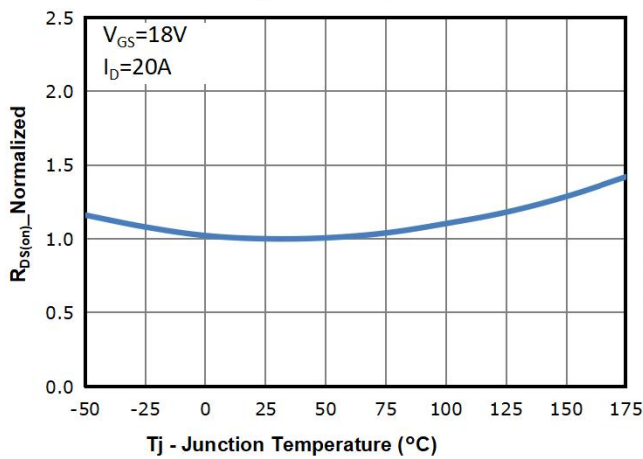


Fig 6: $V_{GS(th)}$ vs. Temperature

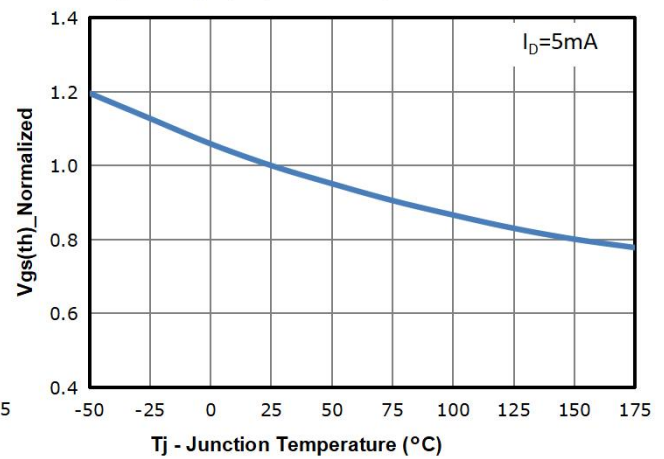


Fig 7: BVdss vs. Temperature

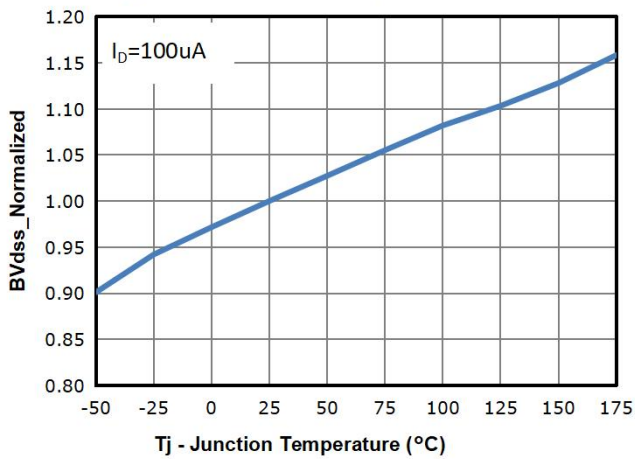


Fig 8: Capacitance Characteristics

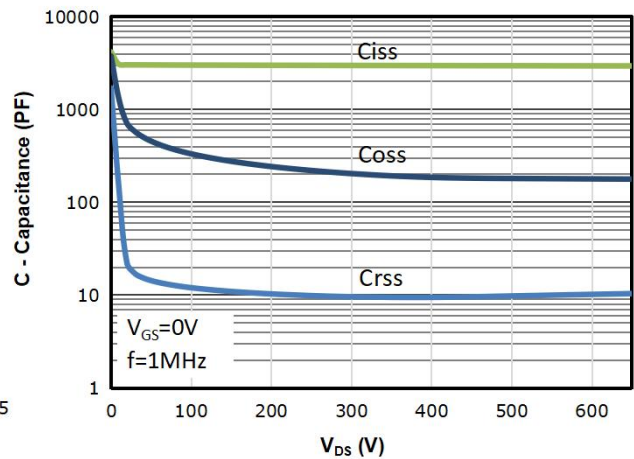


Fig 9: Gate Charge Characteristics

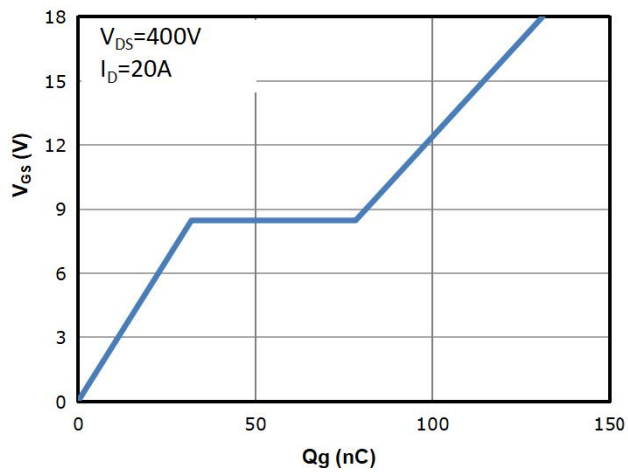


Fig 10: Body-diode Forward Characteristics

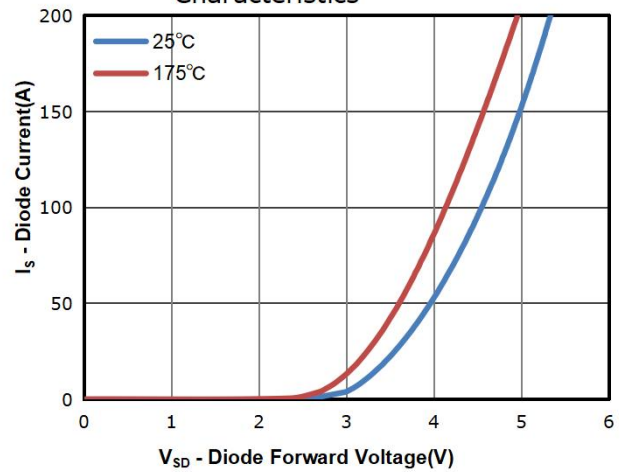


Fig 11: Power Dissipation

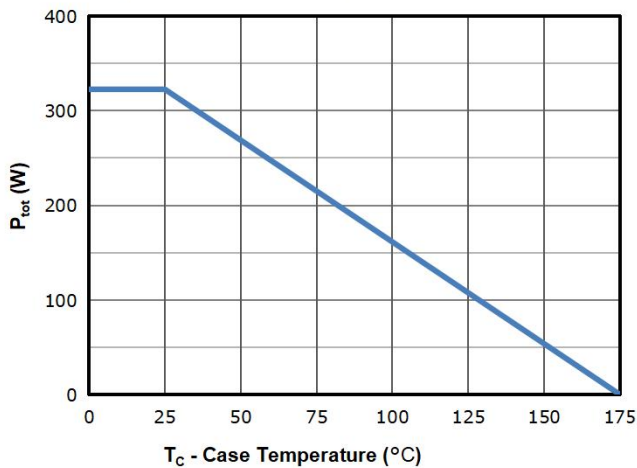


Fig 12: Drain Current Derating

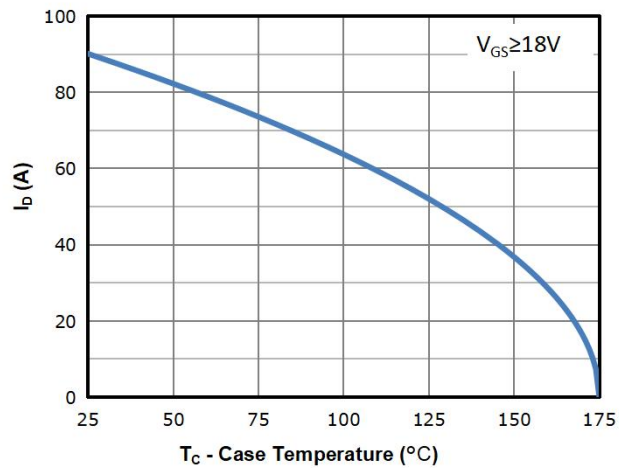




Fig 13: Safe Operating Area

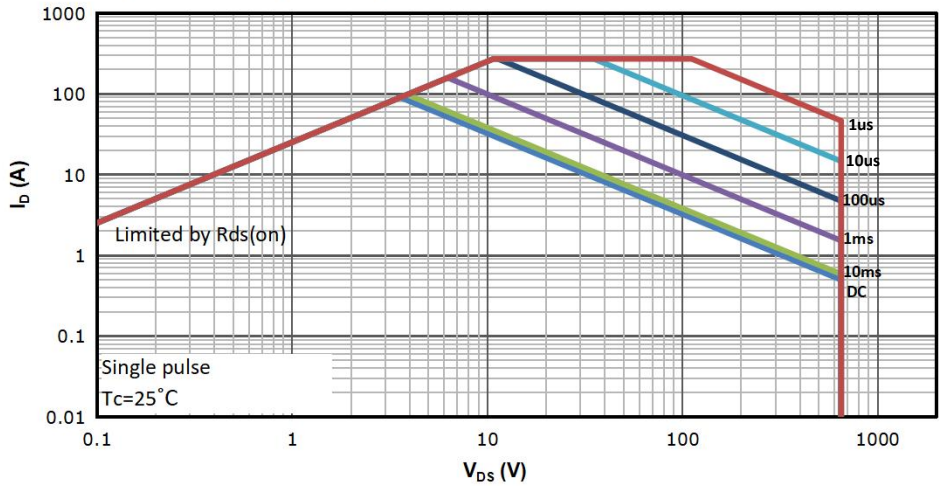
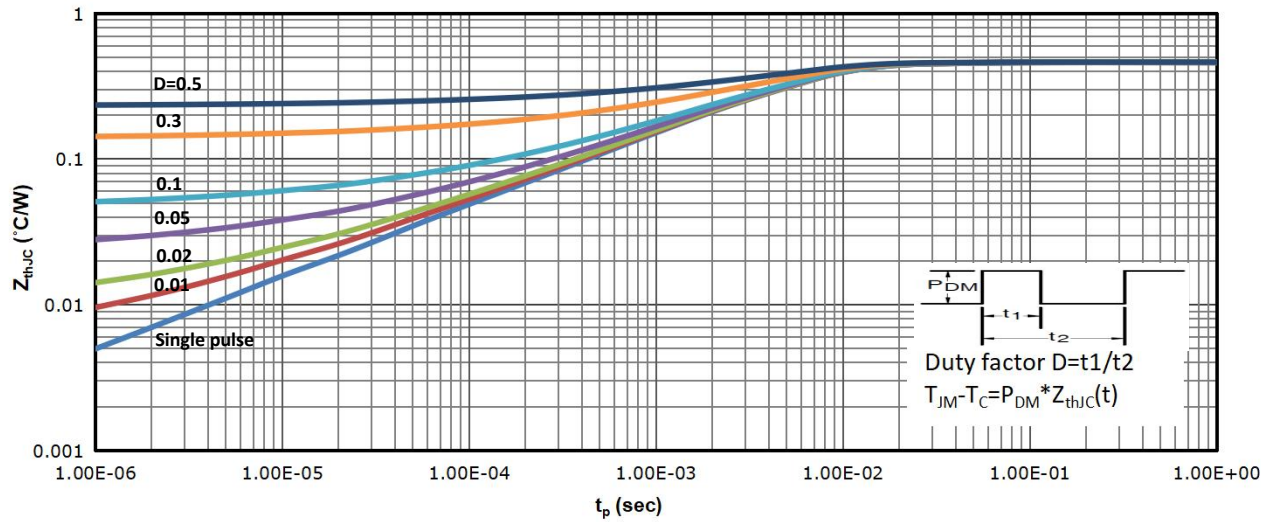
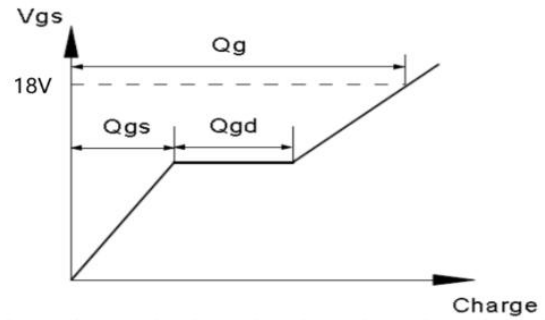
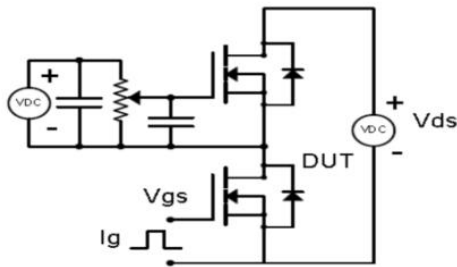


Fig 14: Max. Transient Thermal Impedance

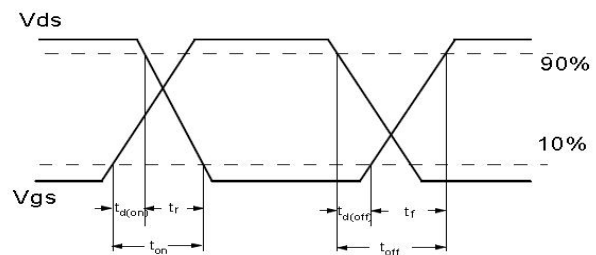
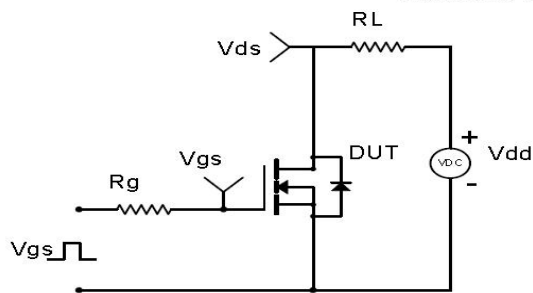


Test Circuit & Waveform

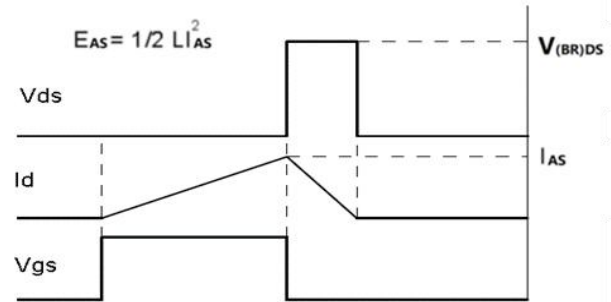
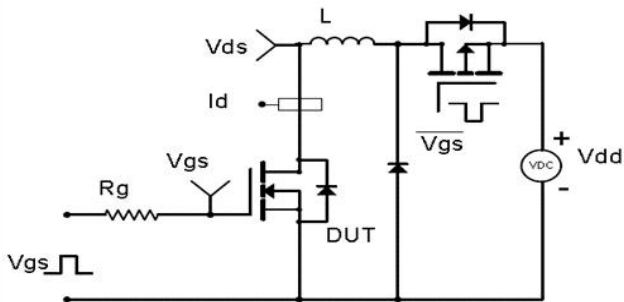
Gate Charge Test Circuit & Waveform



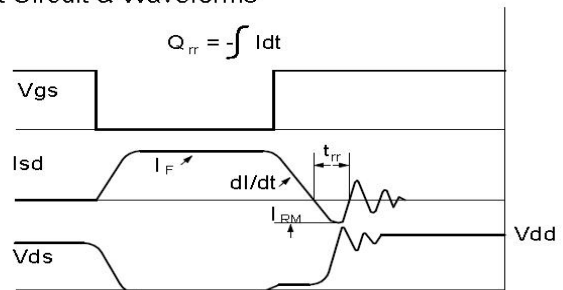
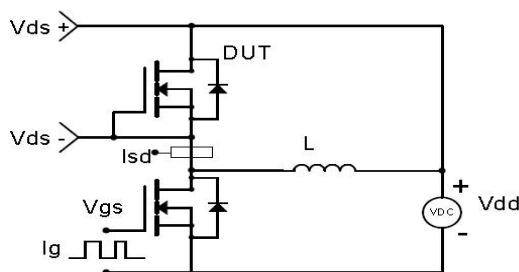
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



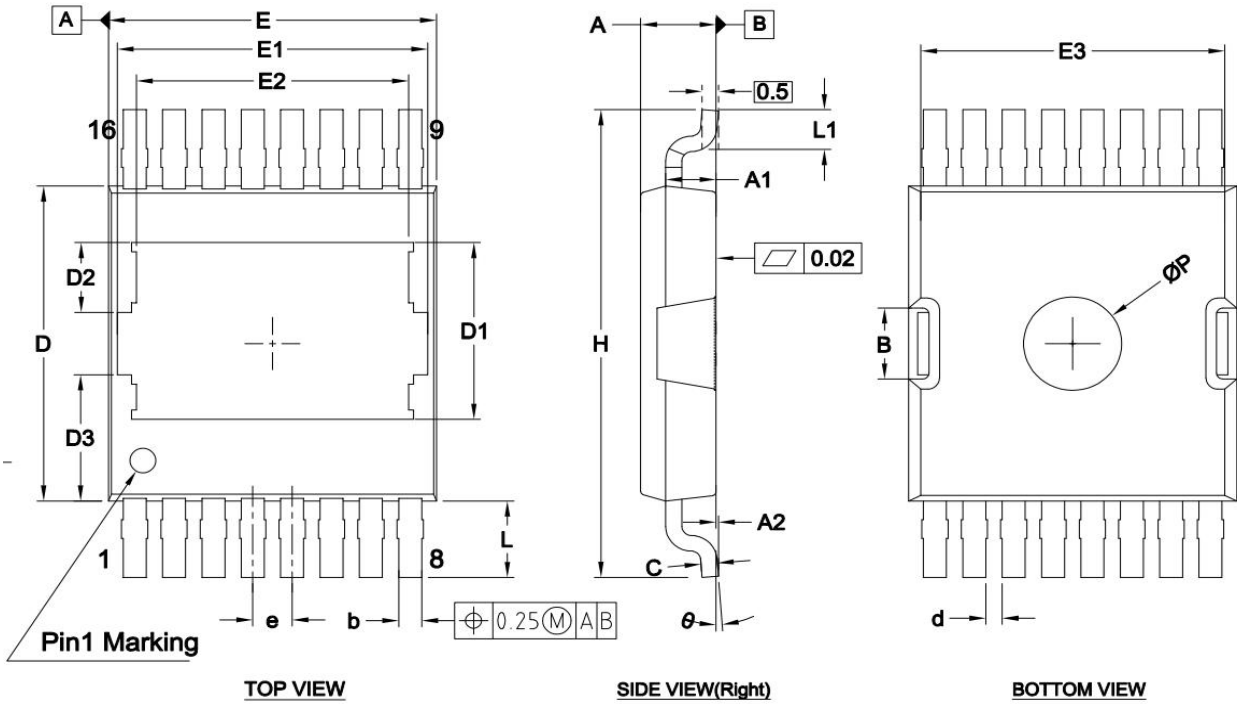
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Package Outline: TOLT



DIM	MIN.	NOM.	MAX.
A	2.25	2.30	2.35
A1	1.44	1.54	1.64
A2	0.01	---	0.16
b	0.60	0.70	0.80
c	0.40	0.50	0.60
d	0.40	0.50	0.60
e	1.20 BSC		
D	10.00	10.10	10.30
D1	5.47	5.67	5.87
D2	2.04	2.24	2.44
D3	4.05 REF.		
E	9.70	10.00	10.30
E1	9.46 REF.		
E2	8.10	8.30	8.50
E3	9.07	9.27	9.47
H	14.80	15.00	15.20
L	2.25	2.45	2.65
L1	1.35	1.50	1.65
ØP	2.35	2.50	2.65
B	2.08	2.28	2.48
θ	1°	3°	5°

Disclaimer

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