

Product Summary

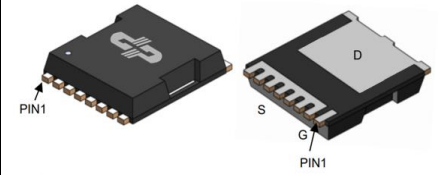
Part #	V_{DS}	$R_{DS(on).typ}$	I_D
DP053N10TGN	100V	4.4mΩ	158A

Features

- Uses advanced Trench MOSFET-DPMOS technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent $Q_g \times R_{DS(on)}$ product(FOM)
- Qualified according to JEDEC criteria

Applications

- Motor control and drive
- Battery management
- UPS (Uninterruptible Power Supplies)



100% Avalanche Tested

100% Rg Tested

Package Marking and Ordering Information

Part #	Marking	Package	Packing
DP053N10TGN	053N10TGN	TOLL	Tape



Halogen-Free

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	100	V
Continuous drain current $T_C = 25^\circ\text{C}$ (Silicon limit) $T_C = 25^\circ\text{C}$ (Package limit) $T_C = 100^\circ\text{C}$ (Silicon limit)	I_D	158 180 112	A
Pulsed drain current ($T_C = 25^\circ\text{C}$, t_p limited by T_{jmax})	$I_{D \text{ pulse}}$	632	A
Avalanche energy, single pulse ($I_D=36\text{A}$, $R_g=25$) ^[1]	E_{AS}	343	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation ($T_C = 25^\circ\text{C}$)	P_{tot}	273	W
Operating junction and storage temperature	T_j, T_{stg}	-55...+175	°C

[1].EAS is tested at starting $T_j = 25^\circ\text{C}$, $V_{GS} = 10\text{V}$.

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	0.55	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	62	

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}	100	-	-	V	$V_{GS}=0V, I_D=250\mu A$
Gate threshold voltage	$V_{GS(th)}$	2	3	4	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	$V_{DS}=100V, V_{GS}=0V$ $T_j=25^{\circ}\text{C}$
		-	-	100		$T_j=125^{\circ}\text{C}$
Gate-source leakage current	I_{GSS}	-	-	± 100	nA	$V_{GS}=\pm 20V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	4.4	5.2	mΩ	$V_{GS}=10V, I_D=60A$ $T_j=25^{\circ}\text{C}$
Gate resistance	R_g	-	2	4	Ω	$V_{GS}=0V, V_{DS}=0V$, $f=1\text{MHz}$
Transconductance ^[2]	g_{fs}	-	86.9	-	S	$V_{DS}=5V, I_D=60A$

Dynamic Characteristic^[2]

Input Capacitance	C_{iss}	-	4052	-	pF	$V_{GS}=0V, V_{DS}=50V$, $f=1\text{MHz}$
Output Capacitance	C_{oss}	-	596	-		
Reverse Transfer Capacitance	C_{rss}	-	32	-		
Gate Total Charge	Q_g	-	67.9	-	nC	$V_{GS}=10V, V_{DS}=50V$, $I_D=60A, f=1\text{MHz}$
Gate-Source charge	Q_{gs}	-	27.2	-		
Gate-Drain charge	Q_{gd}	-	17.2	-		
Turn-on delay time	$t_{d(on)}$	-	22.8	-	ns	$V_{GS}=10V, V_{DD}=50V$, $R_{G_ext}=2.7\Omega$
Rise time	t_r	-	84	-		
Turn-off delay time	$t_{d(off)}$	-	41.8	-		
Fall time	t_f	-	71.5	-		

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	0.9	1.3	V	$V_{GS}=0V, I_{SD}=60A$
Diode continuous forward current	I_s	-	158	-	A	$TC = 25^{\circ}C$
Diode pluse current	$I_{s\ pluse}$	-	632	-	A	$TC = 25^{\circ}C$
Body Diode Reverse Recovery Time ^[2]	t_{rr}	-	62	-	ns	$I_F=60A, dI/dt=100A/\mu s$
Body Diode Reverse Recovery Charge ^[2]	Q_{rr}	-	107	-	nC	

[2]. Defined by design. Not subject to production test

Typical Performance Characteristics

Fig 1: Output Characteristics

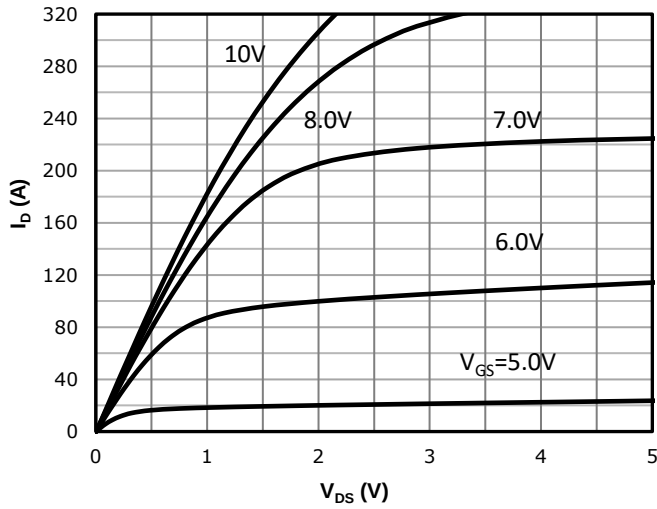


Fig 2: Transfer Characteristics

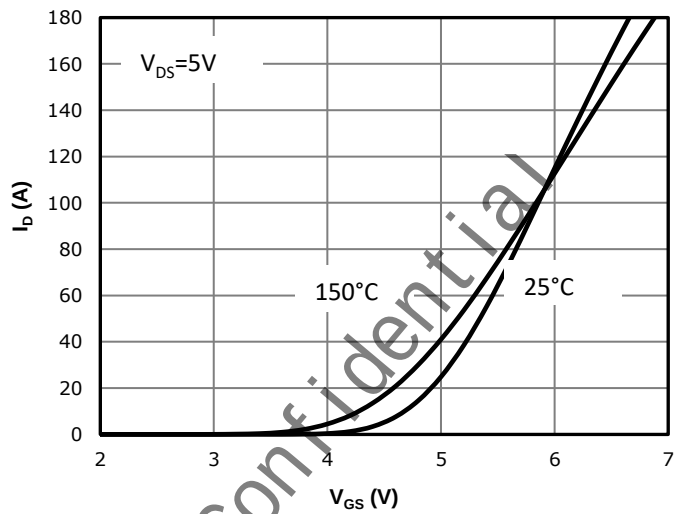


Fig 3: $R_{DS(on)}$ vs Drain Current and Gate Voltage

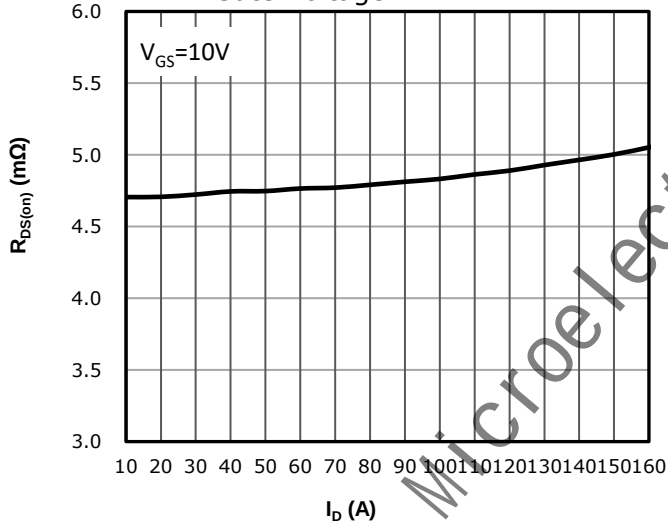


Fig 4: $R_{DS(on)}$ vs Gate Voltage

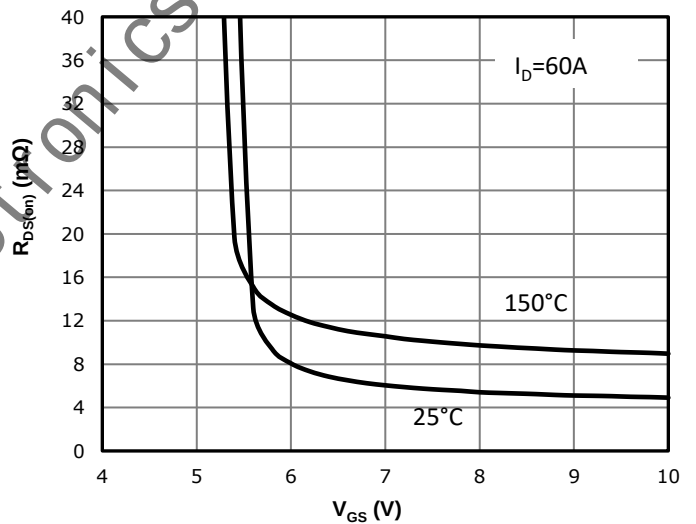


Fig 5: $R_{DS(on)}$ vs. Temperature

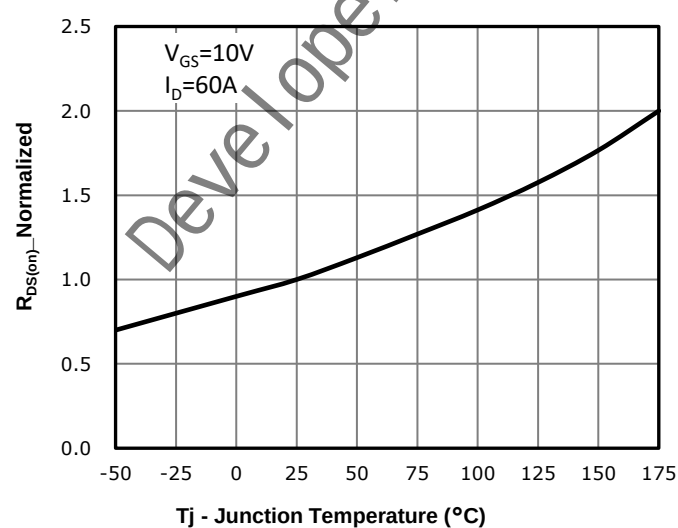


Fig 6: Capacitance Characteristics

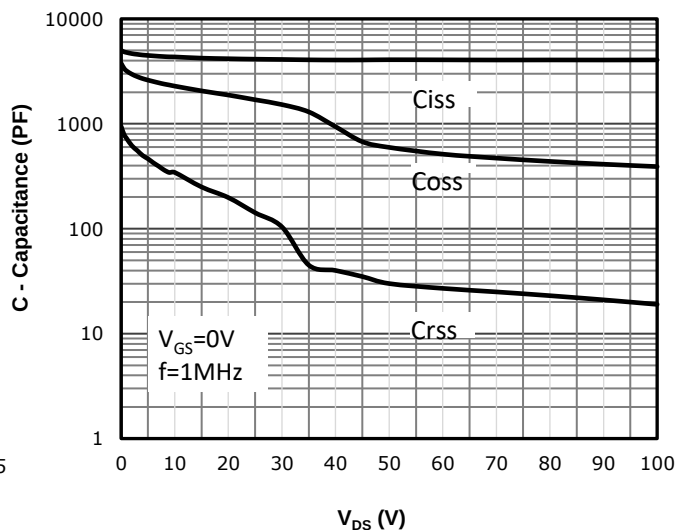


Fig 7: Gate Charge Characteristics

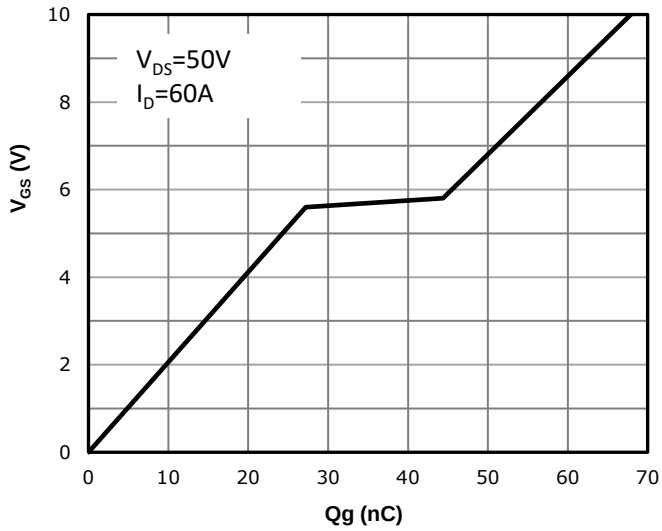


Fig 8: Body-diode Forward Characteristics

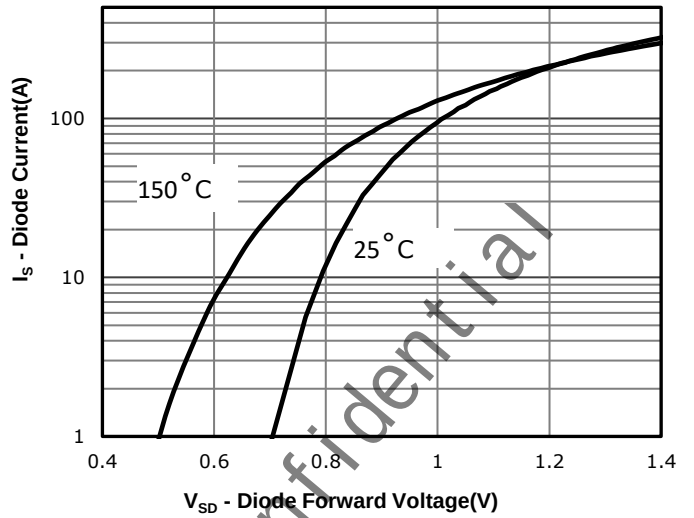


Fig 9: Power Dissipation

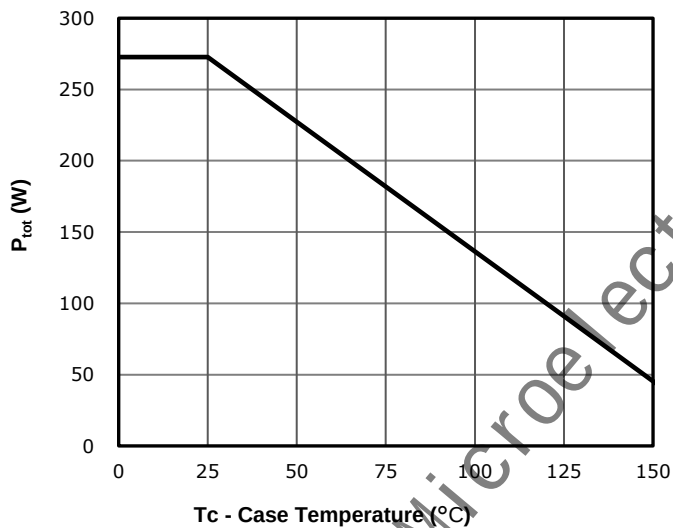


Fig 10: Drain Current Derating

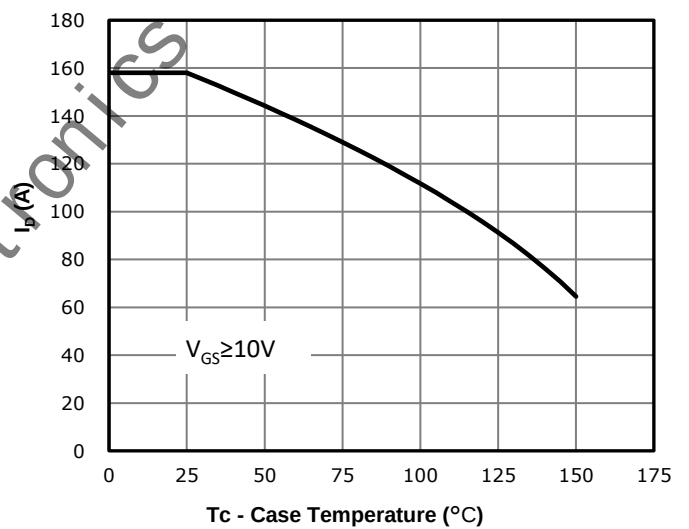


Fig 11: Safe Operating Area

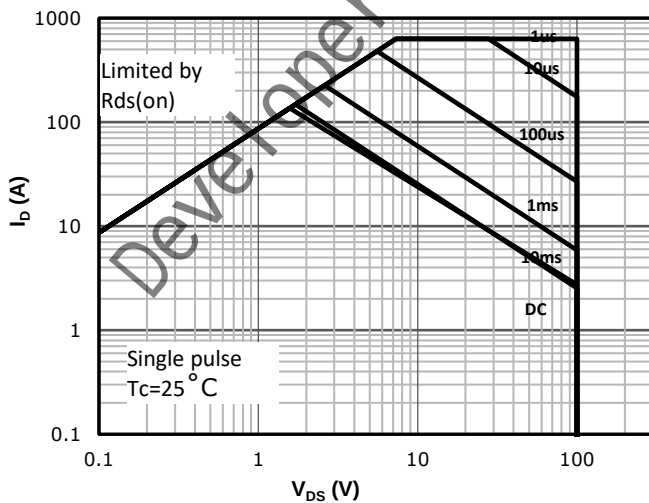
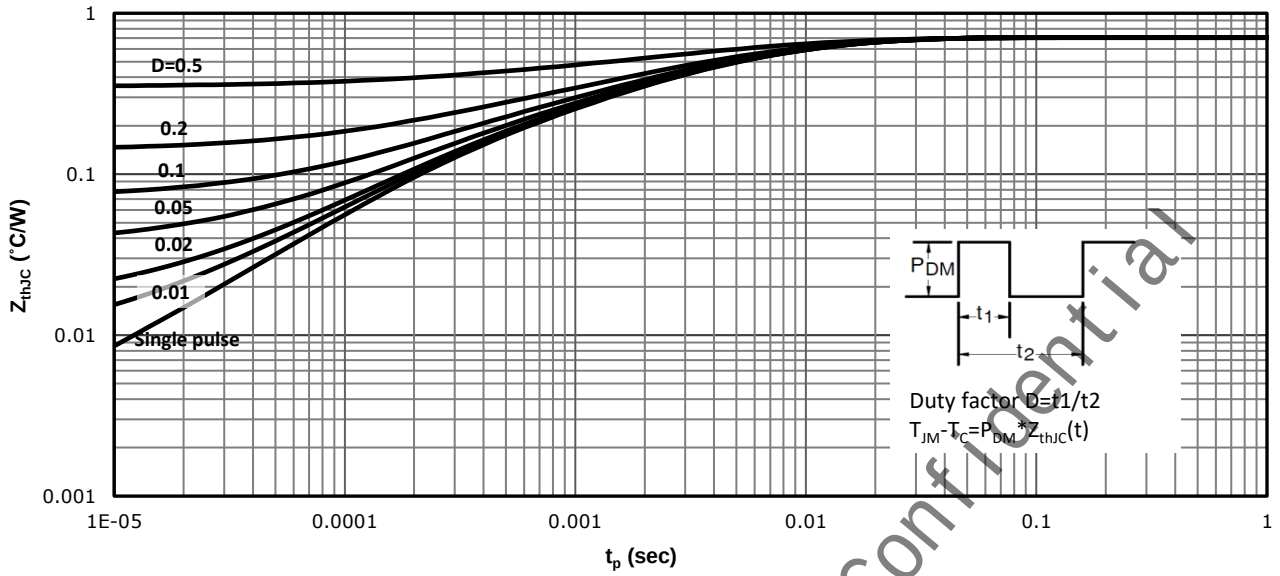
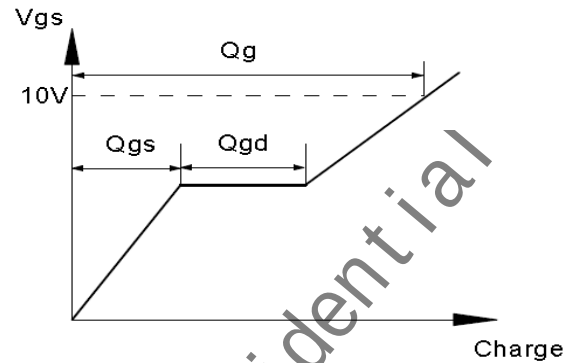
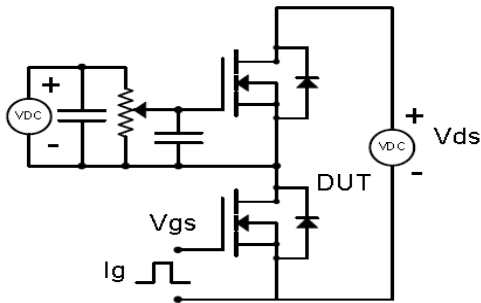


Fig 12: Max. Transient Thermal Impedance

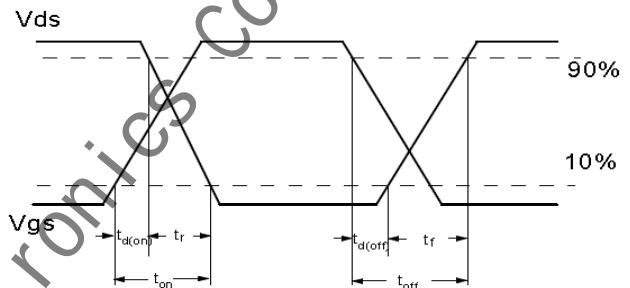
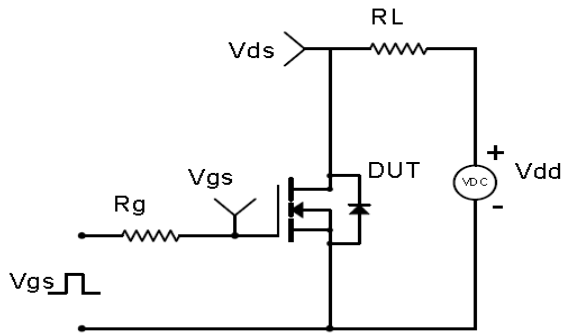


Test Circuit & Waveform

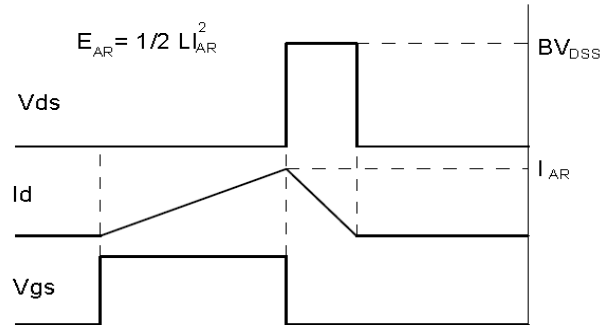
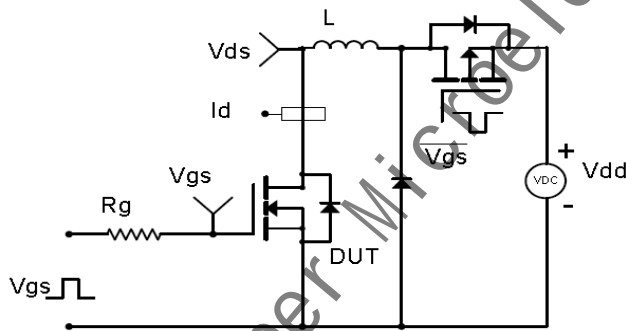
Gate Charge Test Circuit & Waveform



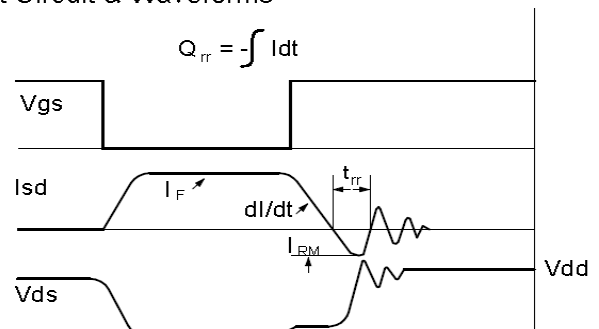
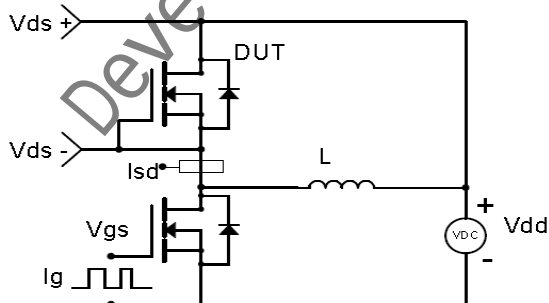
Resistive Switching Test Circuit & Waveforms



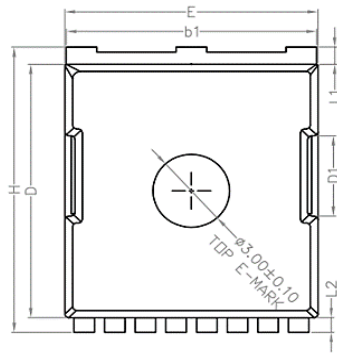
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



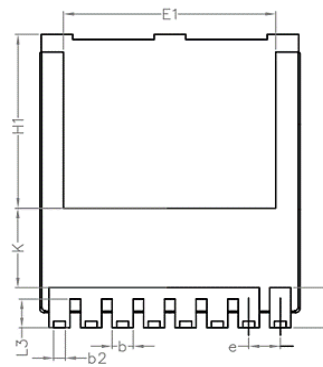
Diode Recovery Test Circuit & Waveforms



Package Outline: TOLL



TOP VIEW



BOTTOM VIEW



SIDE VIEW

Symbol	Common Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.20	2.40	0.09	0.09
b	0.70	0.90	0.03	0.04
b1	9.70	9.90	0.38	0.39
b2	0.40	0.50	0.02	0.02
c	0.40	0.60	0.02	0.02
D	10.28	10.58	0.40	0.42
D1	3.15	3.45	0.12	0.14
E	9.70	10.10	0.38	0.40
E1	7.90	8.30	0.31	0.33
e	1.10	1.30	0.04	0.05
H	11.48	11.88	0.45	0.47
H1	6.75	7.15	0.27	0.28
K	3.03	3.33	0.12	0.13
L	1.50	1.70	0.06	0.07
L1	0.55	0.85	0.02	0.03
L2	0.45	0.75	0.02	0.03
L3	1.00	1.30	0.04	0.05

Revision History

Revision	Major changes
1.1	Release for formal version

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