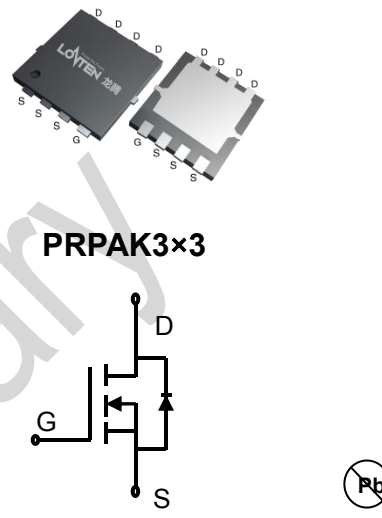


Lonten N-channel 40V, 39A, 7.5mΩ Power MOSFET

<p>Description These N-Channel enhancement mode power field effect transistors are using split gate trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and with stand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.</p> <p>Features</p> <ul style="list-style-type: none"> ◆ 40V,39A, $R_{DS(on),max} = 7.5m\Omega @ V_{GS} = 10V$ ◆ Improved dv/dt capability ◆ Fast switching ◆ 100% EAS Guaranteed ◆ Green device available <p>Applications</p> <ul style="list-style-type: none"> ◆ Motor Drives ◆ UPS ◆ DC-DC Converter 	<p>Product Summary</p> <table style="width: 100%; border: none;"> <tr> <td style="padding: 2px;">V_{DSS}</td> <td style="padding: 2px;">40V</td> </tr> <tr> <td style="padding: 2px;">$R_{DS(on),max} @ V_{GS}=10V$</td> <td style="padding: 2px;">7.5mΩ</td> </tr> <tr> <td style="padding: 2px;">I_D</td> <td style="padding: 2px;">39A</td> </tr> </table> <p>Pin Configuration</p> <div style="text-align: center;">  <p>PRPAK3×3</p> <p>N-Channel MOSFET</p> </div>	V_{DSS}	40V	$R_{DS(on),max} @ V_{GS}=10V$	7.5mΩ	I_D	39A
V_{DSS}	40V						
$R_{DS(on),max} @ V_{GS}=10V$	7.5mΩ						
I_D	39A						

Absolute Maximum Ratings $T_c = 25^\circ C$ unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	40	V
Continuous drain current ($T_c = 25^\circ C$) ($T_c = 100^\circ C$)	I_D	39	A
		26	A
Pulsed drain current ¹⁾	I_{DM}	117	A
Gate-Source voltage	V_{GSS}	± 20	V
Avalanche energy ²⁾	E_{AS}	11	mJ
Power Dissipation	P_D	24	W
Storage Temperature Range	T_{STG}	-55 to +150	$^\circ C$
Operating Junction Temperature Range	T_J	-55 to +150	$^\circ C$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	5.3	$^\circ C/W$
Thermal Resistance Junction-to-Ambient	$R_{\theta JA}$	78	$^\circ C/W$

Package Marking and Ordering Information

Device	Device Package	Marking
LSGNE04R075WB	PRPAK3X3	04R075

Electrical Characteristics
 $T_J = 25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static characteristics						
Drain-source breakdown voltage	BV_{DSS}	$V_{GS}=0\text{ V}, I_D=250\mu\text{A}$	40	---	---	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	1.2	1.7	2.5	V
Drain-source leakage current	I_{DSS}	$V_{DS}=40\text{ V}, V_{GS}=0\text{V}$	---	---	1	μA
Gate leakage current, Forward	I_{GSSF}	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$	---	---	100	nA
Gate leakage current, Reverse	I_{GSSR}	$V_{GS}=-20\text{ V}, V_{DS}=0\text{ V}$	---	---	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10\text{ V}, I_D=12\text{ A}$	---	5.8	7.5	$\text{m}\Omega$
		$V_{GS}=4.5\text{ V}, I_D=10\text{ A}$	---	8.7	12	$\text{m}\Omega$
Dynamic characteristics						
Input capacitance	C_{iss}	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V},$ $F = 1\text{MHz}$	---	693	---	pF
Output capacitance	C_{oss}		---	195	---	
Reverse transfer capacitance	C_{rss}		---	39.5	---	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 15\text{V}, V_{GS}=10\text{V}, I_D = 12\text{A}$ $R_G=3.3\Omega$	---	14.5	---	ns
Rise time	t_r		---	6.1	---	
Turn-off delay time	$t_{d(off)}$		---	20.5	---	
Fall time	t_f		---	11.6	---	
Gate resistance	R_g	$V_{GS}=0\text{ V}, V_{DS}=0\text{ V}, F=1\text{MHz}$	---	1.8	---	Ω
Gate charge characteristics						
Gate to source charge	Q_{gs}	$V_{DS}=20\text{V}, I_D=12\text{A},$ $V_{GS}= 10\text{ V}$	---	3.1	---	nC
Gate to drain charge	Q_{gd}		---	1.3	---	
Gate charge total	Q_g		---	15.5	---	
Drain-Source diode characteristics and Maximum Ratings						
Continuous Source Current	I_S		---	---	20	A
Pulsed Source Current ³⁾	I_{SM}		---	---	60	A
Diode Forward Voltage	V_{SD}	$V_{GS}=0\text{V}, I_S=12\text{A}, T_J=25^\circ\text{C}$	---	---	1.2	V

Notes:

1: Repetitive Rating: Pulse width limited by maximum junction temperature.

 2: $V_{DD}=25\text{V}, V_{GS}=10\text{V}, L=0.1\text{mH}, I_{AS}=15\text{A},$ Starting $T_J=25^\circ\text{C}$.

 3: Pulse Test: Pulse Width $\leq 300\ \mu\text{s},$ Duty Cycle $\leq 2\%$.

Electrical Characteristics Diagrams

Figure 1. Typ. Output Characteristics

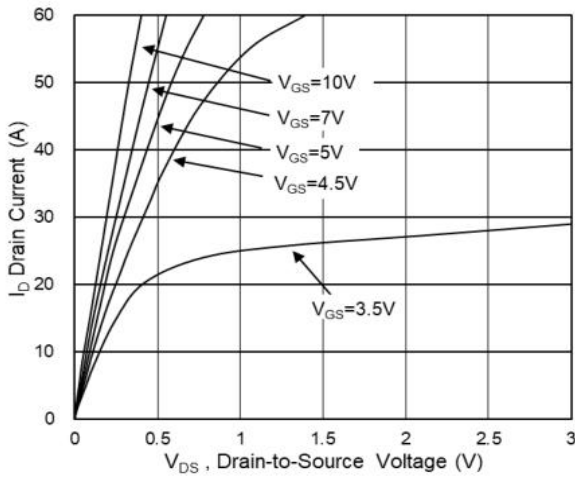


Figure 2. Transfer Characteristics

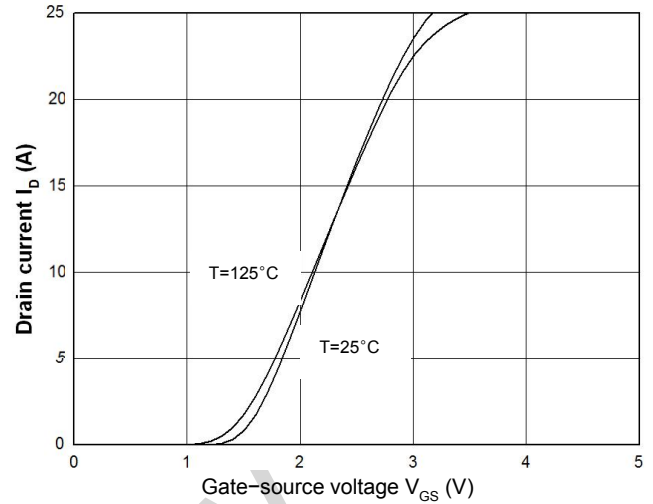


Figure 3. Capacitance Characteristics

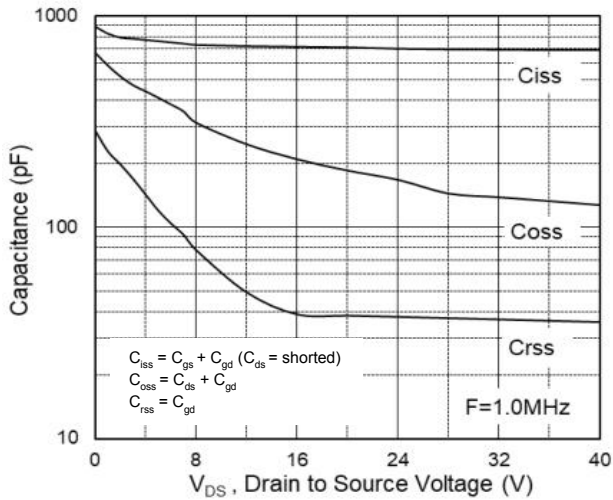


Figure 4. Gate Charge Waveform

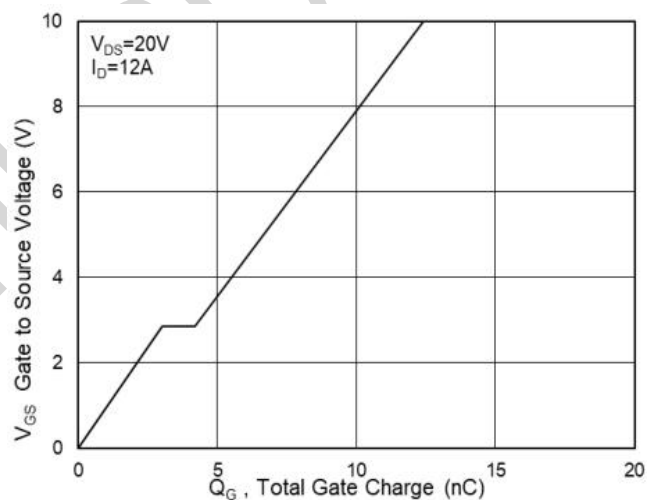


Figure 5. Body-Diode Characteristics

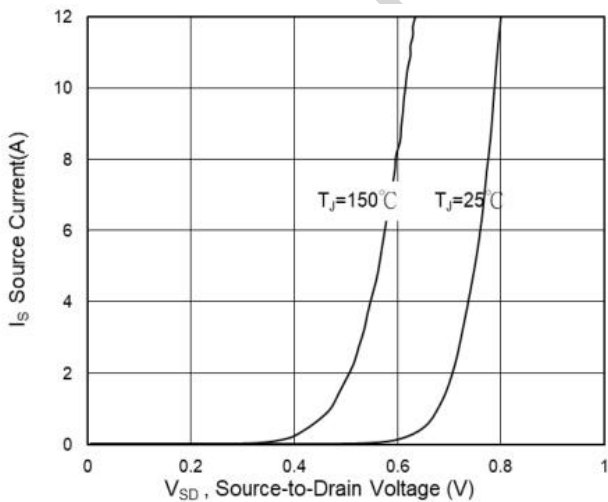


Figure 6. Rdson-Drain Current

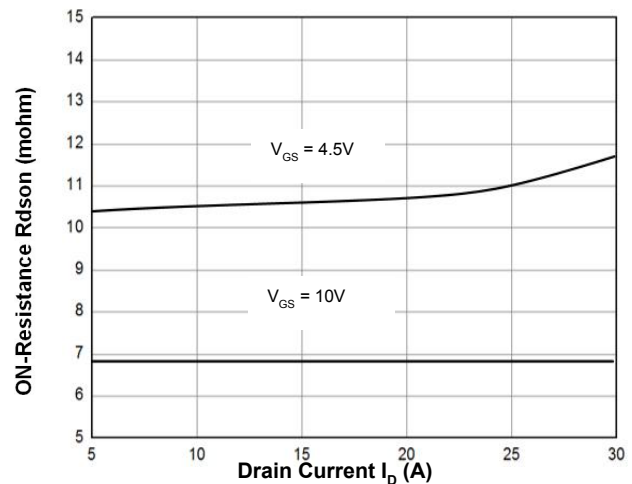


Figure 7. R_{ds(on)}-Junction Temperature

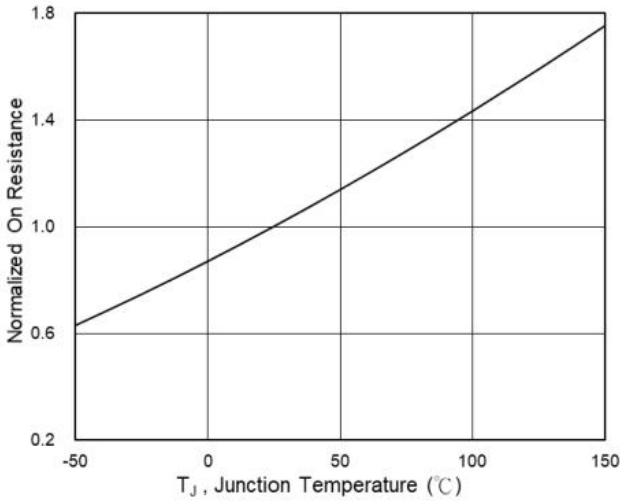


Figure 8. V_{GS(th)}-Junction Temperature

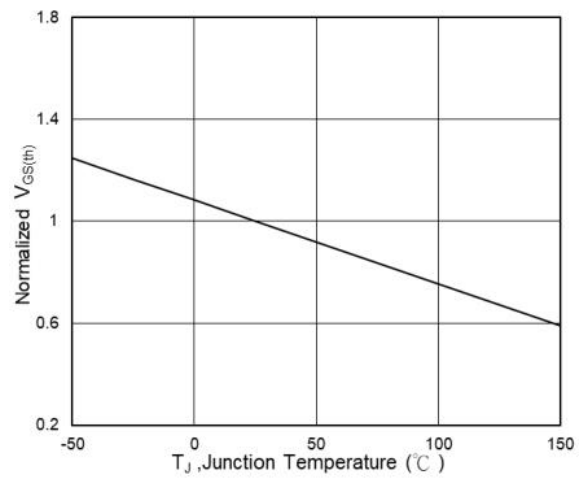


Figure 9. On-Resistance vs. Gate-to-Source voltage

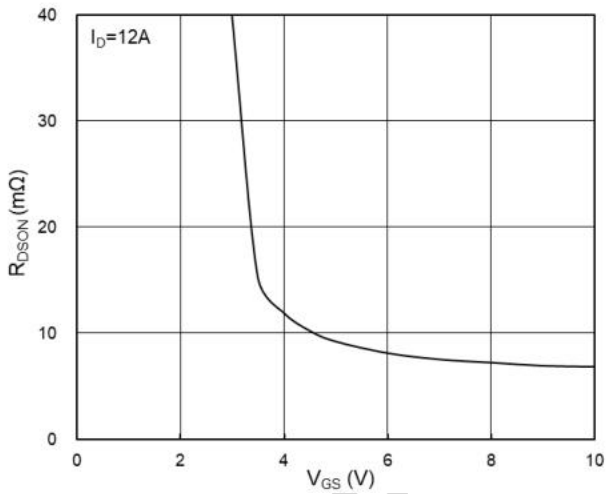


Figure 10: Safe Operating Area

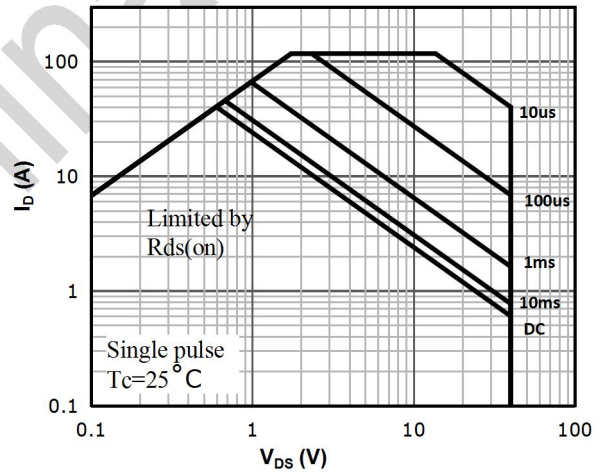
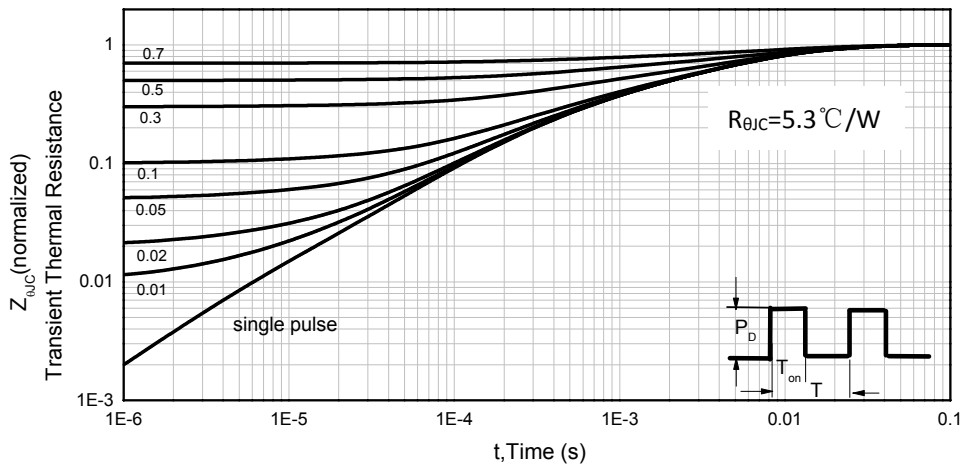
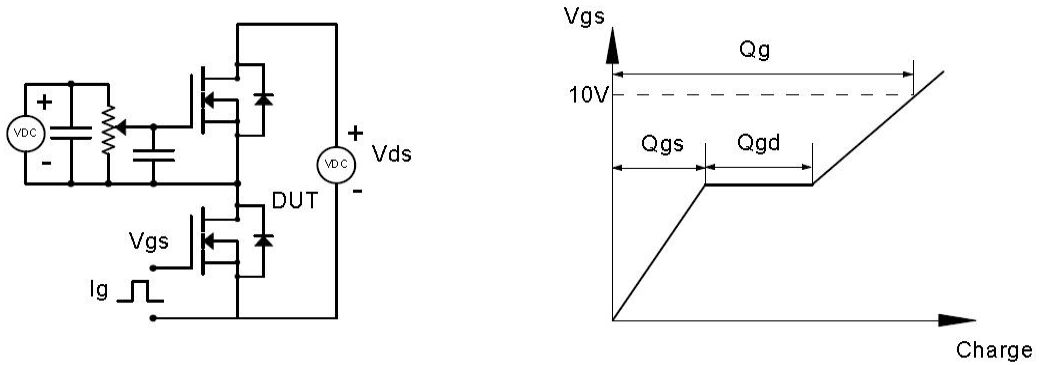


Figure 11. Normalized Maximum Transient Thermal Impedance (R_{thJC})

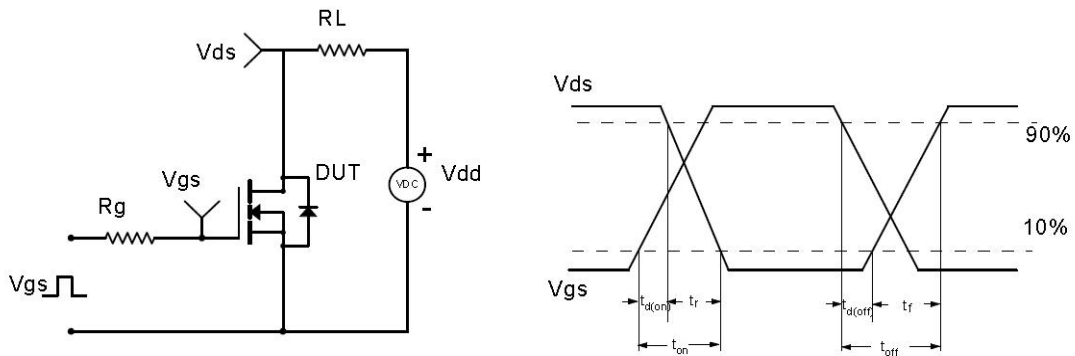


Test Circuit & Waveforms

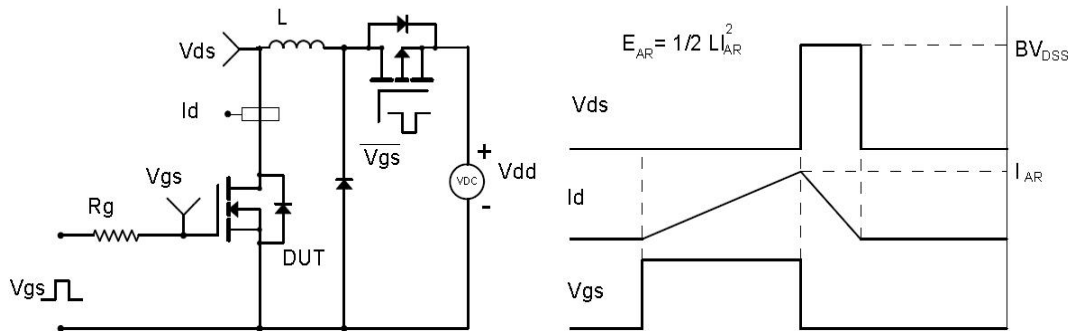
Gate Charge Test Circuit & Waveform



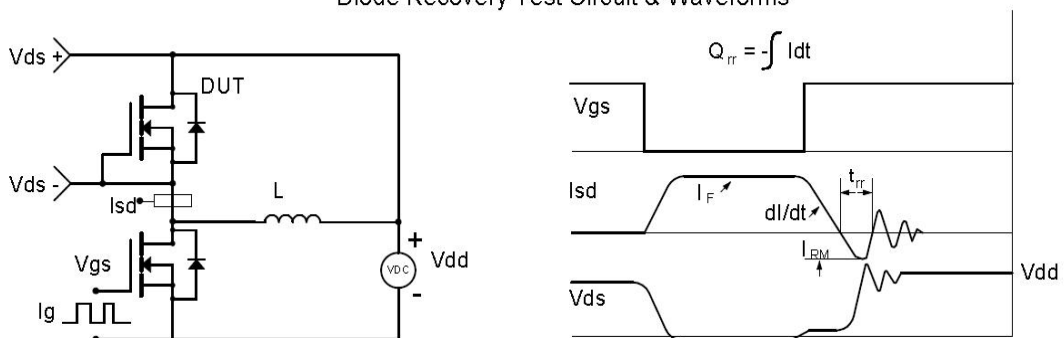
Resistive Switching Test Circuit & Waveforms



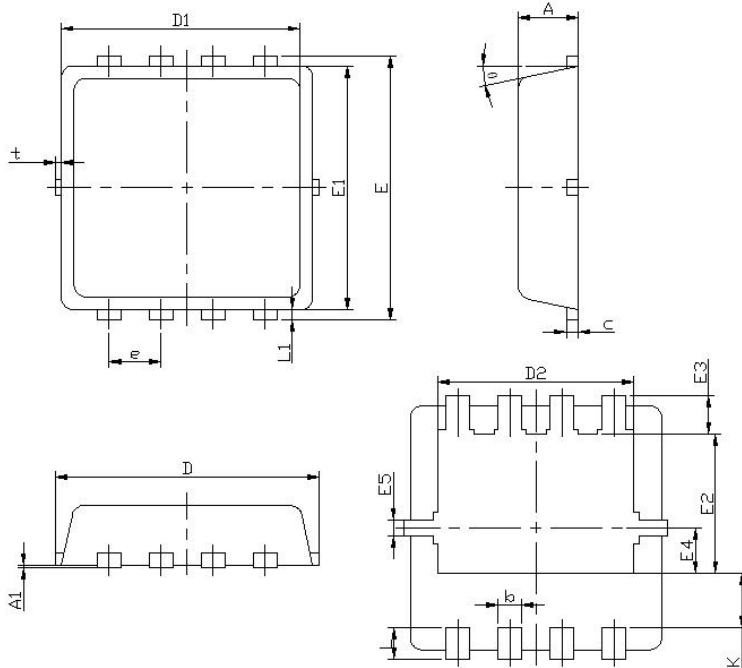
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Mechanical Dimensions for PRPAK3×3



DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES	
SYMBOL	MIN	MAX	MIN	MAX
A	0.70	0.90	0.028	0.035
A1	-	0.15	-	0.006
b	0.20	0.40	0.008	0.016
c	0.10	0.25	0.004	0.010
D	3.00	3.60	0.118	0.142
D1	2.90	3.25	0.114	0.128
D2	2.25	2.69	0.089	0.106
E	3.00	3.60	0.118	0.142
E1	2.90	3.20	0.114	0.126
E2	1.54	2.2	0.061	0.087
E3	0.28	0.65	0.011	0.026
E4	0.37	0.77	0.015	0.030
E5	0.075	0.3	0.003	0.012
e	0.6	0.7	0.024	0.028
K	0.52	0.89	0.020	0.035
L	0.15	0.5	0.006	0.020
L1	0.05	0.5	0.002	0.020
t	-	0.2	-	0.008
θ	9°	14°	9°	14°

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