
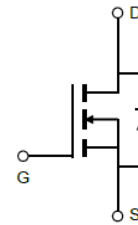
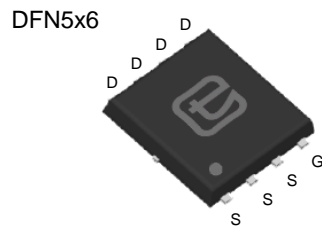




## 20V N-Channel Trench MOSFET(Preliminary)

<p><b>General Description</b></p> <ul style="list-style-type: none"> <li>● Trench Power technology</li> <li>● Low <math>R_{DS(ON)}</math></li> <li>● Low Gate Charge</li> <li>● Optimized for fast-switching applications</li> </ul> <p><b>Applications</b></p> <ul style="list-style-type: none"> <li>● Synchronous Rectification in DC/DC and AC/DC Converters</li> <li>● Isolated DC/DC Converters in Telecom and Industrial</li> </ul>	<p><b>Product Summary</b></p> <table border="0"> <tr> <td><math>V_{DS}</math></td> <td>20V</td> </tr> <tr> <td><math>I_D</math> (at <math>V_{GS}=10V</math>)</td> <td>120A</td> </tr> <tr> <td><math>R_{DS(ON)}</math> (at <math>V_{GS}=10V</math>)</td> <td>&lt; 3.4m<math>\Omega</math></td> </tr> <tr> <td><math>R_{DS(ON)}</math> (at <math>V_{GS}=4.5V</math>)</td> <td>&lt; 3.8m<math>\Omega</math></td> </tr> <tr> <td><math>R_{DS(ON)}</math> (at <math>V_{GS}=2.5V</math>)</td> <td>&lt; 5.1m<math>\Omega</math></td> </tr> </table> <p>100% UIS Tested</p> 	$V_{DS}$	20V	$I_D$ (at $V_{GS}=10V$ )	120A	$R_{DS(ON)}$ (at $V_{GS}=10V$ )	< 3.4m $\Omega$	$R_{DS(ON)}$ (at $V_{GS}=4.5V$ )	< 3.8m $\Omega$	$R_{DS(ON)}$ (at $V_{GS}=2.5V$ )	< 5.1m $\Omega$
$V_{DS}$	20V										
$I_D$ (at $V_{GS}=10V$ )	120A										
$R_{DS(ON)}$ (at $V_{GS}=10V$ )	< 3.4m $\Omega$										
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$R_{DS(ON)}$ (at $V_{GS}=2.5V$ )	< 5.1m $\Omega$										



Part Number	Package Type	Form	Marking
TTG120N02GT	DFN5x6	Tape&Reel	120N02GT

### Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>B</sup>	$I_D$	$T_C = 25^\circ\text{C}$	51
		$T_C = 100^\circ\text{C}$	51
Pulsed Drain Current <sup>A</sup>	$I_{DM}$	360	A
Avalanche Current <sup>A</sup>	$I_{AS}$	26	A
Single Pulse Avalanche Energy <sup>A</sup>	$E_{AS}$	101	mJ
Power Dissipation <sup>C</sup>	$P_D$	$T_C = 25^\circ\text{C}$	108
		$T_C = 100^\circ\text{C}$	54.3
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 175	$^\circ\text{C}$

### Thermal Characteristics

Parameter	Symbol	Maximum	Units
Maximum Junction-to-Case	$R_{\theta JC}$	1.38	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Ambient	$R_{\theta JA}$	100	



Electrical Characteristics( $T_J = 25^\circ\text{C}$ unless otherwise noted)							
Symbol	Parameter	Conditions	Value			Units	
			Min	Typ	Max		
<b>STATIC PARAMETERS</b>							
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	20			V	
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 20\text{V}, V_{GS} = 0\text{V}$	$T_J = 25^\circ\text{C}$		1	$\mu\text{A}$	
			$T_J = 100^\circ\text{C}$		25		
$I_{GSS}$	Gate-Body Leakage Current	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$			$\pm 100$	nA	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	0.5	0.7	1.2	V	
$R_{DS(on)}$	Static Drain-Source On-Resistance		$V_{GS} = 10\text{V}, I_D = 30\text{A}$		2.6	3.4	$\text{m}\Omega$
			$V_{GS} = 4.5\text{V}, I_D = 30\text{A}$		2.9	3.8	$\text{m}\Omega$
			$V_{GS} = 2.5\text{V}, I_D = 30\text{A}$		3.9	5.1	$\text{m}\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = 10\text{V}, I_D = 20\text{A}$		15		S	
$V_{SD}$	Diode Forward Voltage	$I_S = 50\text{A}, V_{GS} = 0\text{V}$			1	V	
$I_S$	Maximum Body-Diode Continuous Current <sup>B</sup>				51	A	
<b>DYNAMIC PARAMETERS</b>							
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{V}, V_{DS} = 10\text{V}, f = 1\text{MHz}$		4066		$\text{pF}$	
$C_{oss}$	Output Capacitance			1107			
$C_{rss}$	Reverse Transfer Capacitance			655			
<b>SWITCHING PARAMETERS</b>							
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS} = 10\text{V}, V_{DS} = 10\text{V}, I_D = 50\text{A}$		118		nC	
$Q_{gs}$	Gate Source Charge			7			
$Q_{gd}$	Gate Drain Charge			22			
$t_{D(on)}$	Turn-On Delay Time	$V_{GS} = 10\text{V}, V_{DS} = 10\text{V}, I_D = 50\text{A}, R_G = 3\Omega$		12		ns	
$t_r$	Turn-On Rise Time			11			
$T_{D(off)}$	Turn-Off Delay Time			39			
$t_f$	Turn-Off Fall Time			18			
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F = 50\text{A}, di/dt = 100\text{A}/\mu\text{s}$		19		ns	
$Q_{rr}$	Body Diode Reverse Recovery Charge			17		nC	

A. Single pulse width limited by maximum junction temperature.

B. The maximum current rating is package limited.

C. The power dissipation  $P_D$  is based on  $T_{J(MAX)} = 175^\circ\text{C}$ , using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.



### TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

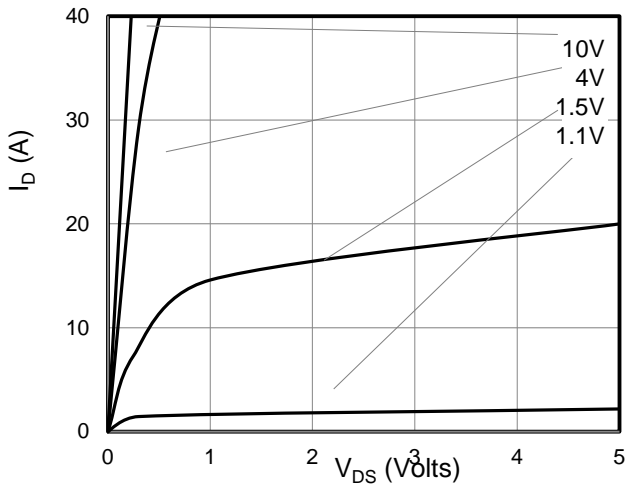


Figure 1: On-Region Characteristics

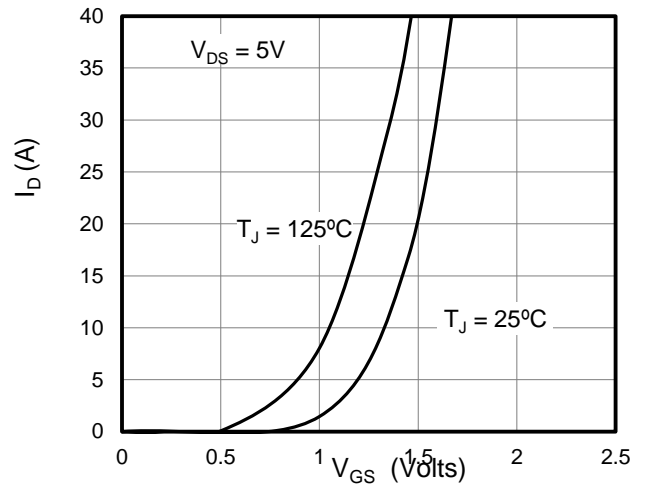


Figure 2: Transfer Characteristics

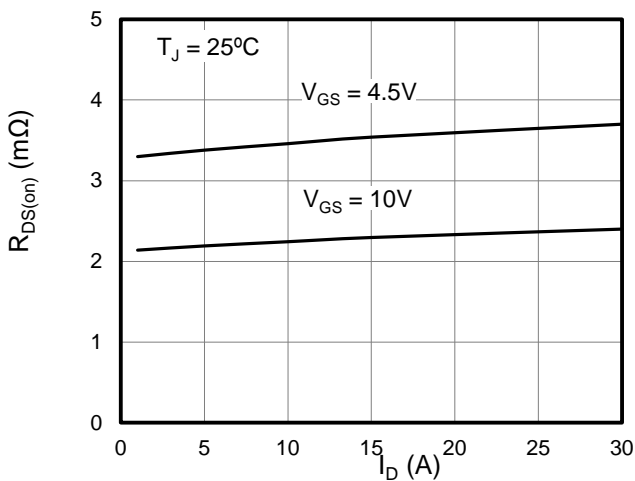


Figure 3: On-Resistance vs. Drain Current

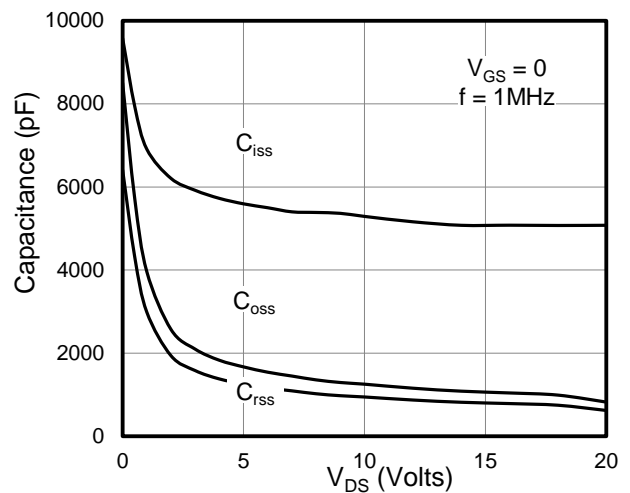


Figure 4: Capacitance Characteristics

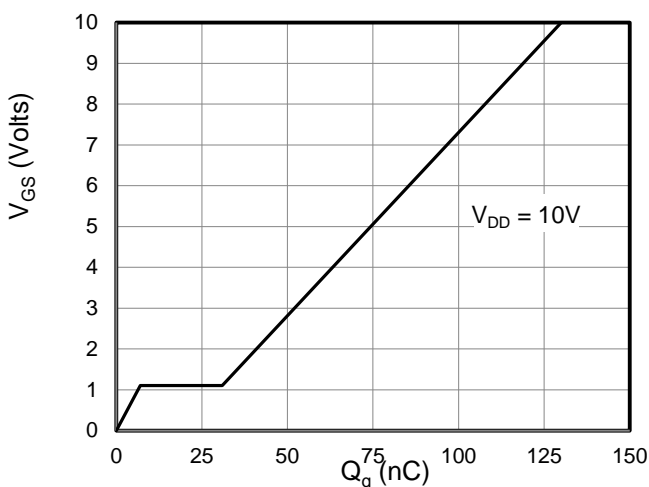


Figure 5: Gate Charge Characteristics

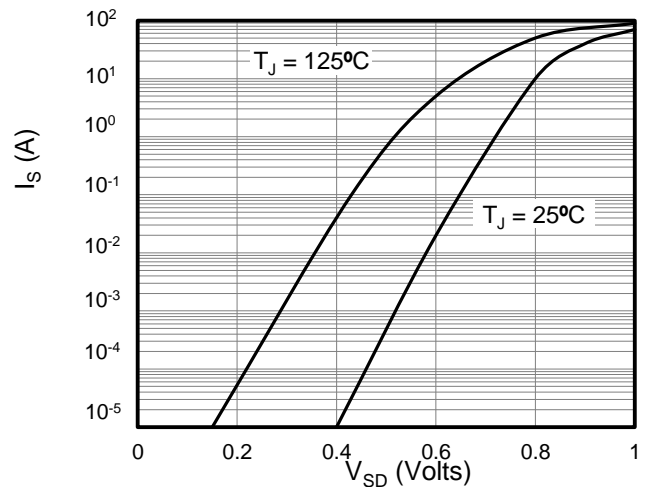


Figure 6: Body Diode Forward Voltage



### TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

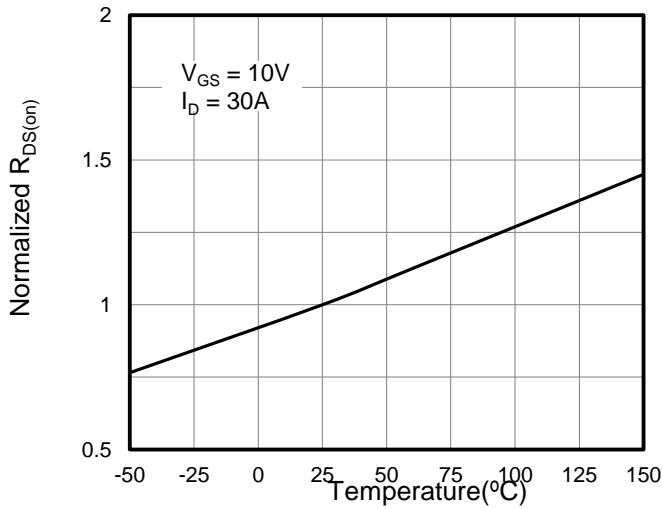


Figure 7: On-Resistance vs. Junction Temperature

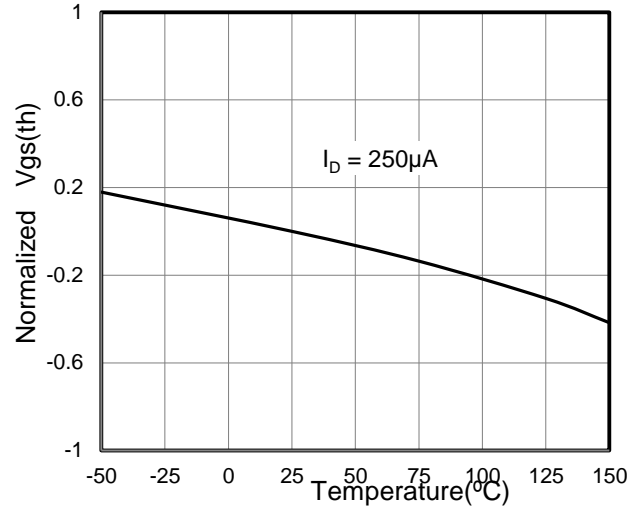


Figure 8:  $V_{gs(th)}$  vs. Junction Temperature

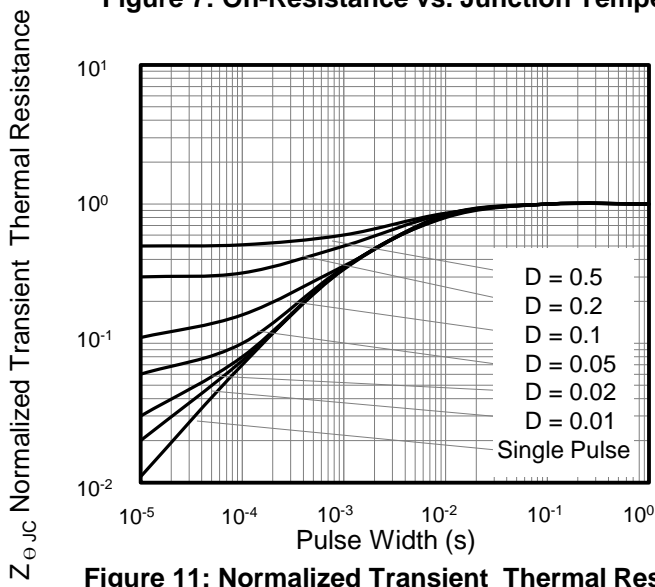


Figure 11: Normalized Transient Thermal Resistance

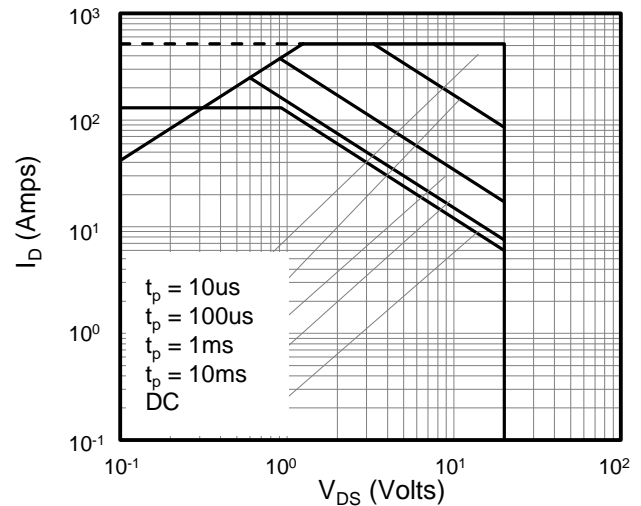


Figure 12: Safe Operating Area

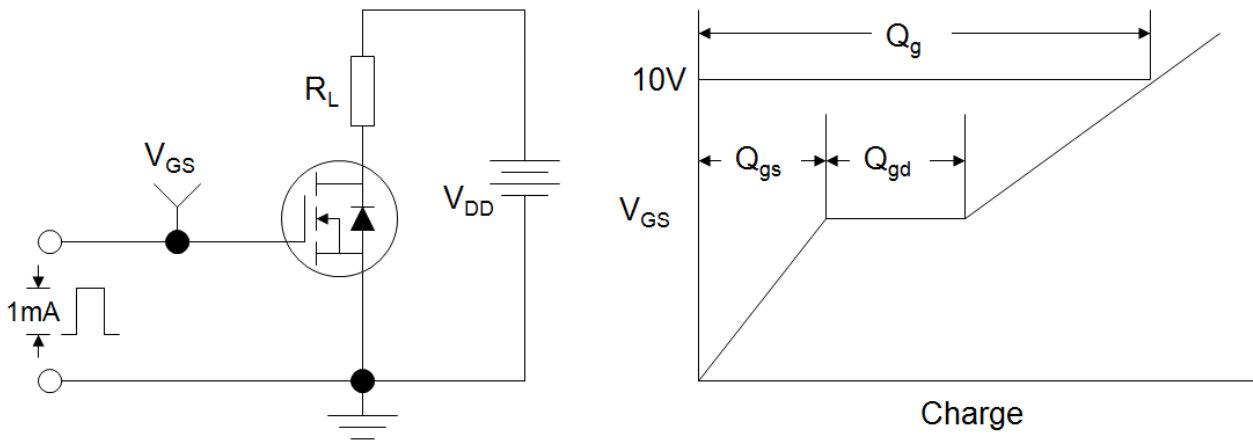


Figure A: Gate Charge Test Circuit and Waveforms

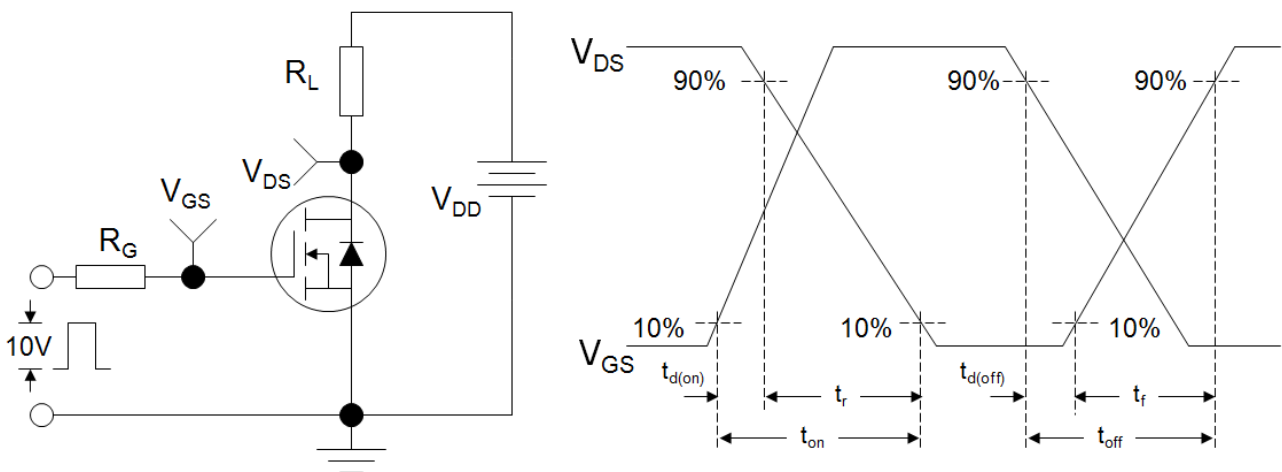


Figure B: Resistive Switching Test Circuit and Waveforms

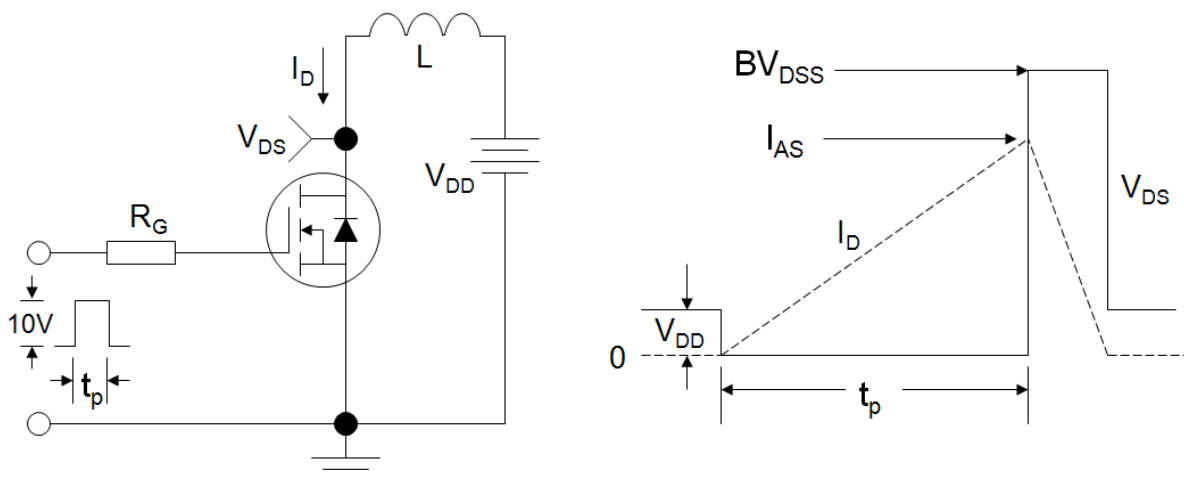
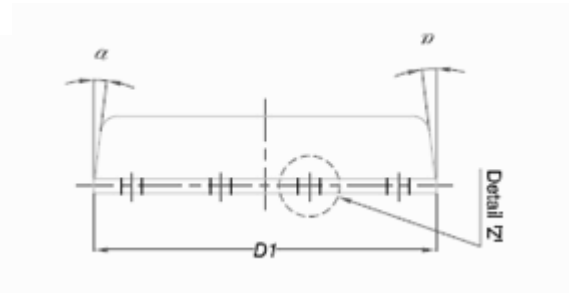
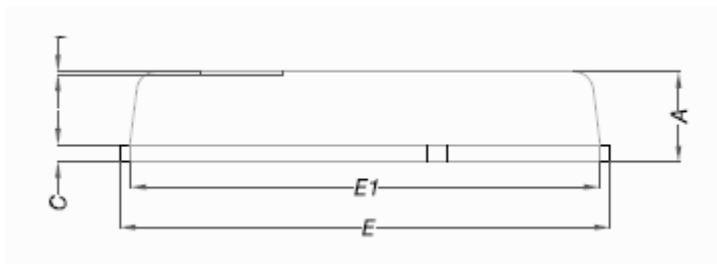
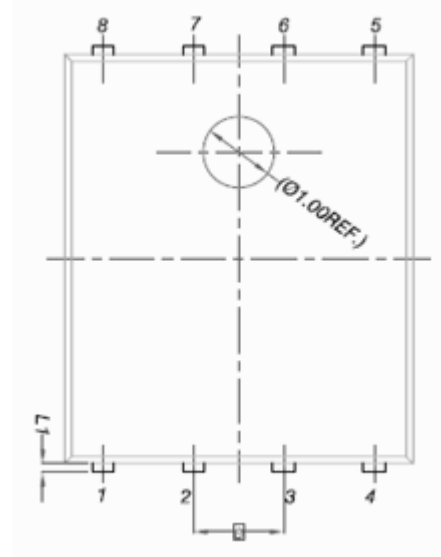
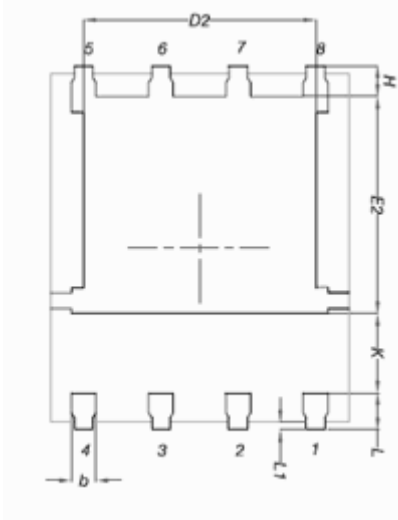


Figure C: Unclamped Inductive Switching (UIS) Test Circuit and Waveforms



### DFN5x6



DIM.	MILLIMETERS			DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.		MIN.	NOM.	MAX.
A	0.90	1.00	1.10	E	5.90	6.00	6.10
A1	0	-	0.05	E1	5.70	5.75	5.80
b	0.33	0.41	0.51	E2	3.38	3.58	3.78
C	0.20	0.25	0.30	e	1.27 BSC		
D1	4.80	4.90	5.00	H	0.41	0.51	0.61
D2	3.61	3.81	3.96	K	1.10	-	-
				L	0.51	0.61	0.71
				L1	0.06	0.13	0.20
				α	0°	-	12°



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