
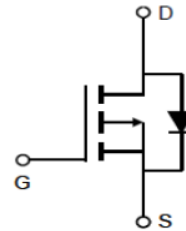
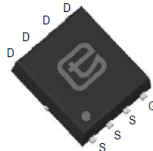


**30V P-Channel Trench MOSFET(Preliminary)**

<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> <tr> <td><math>V_{DS}</math></td> <td>-30V</td> </tr> <tr> <td><math>I_D</math> (at <math>V_{GS} = -10V</math>)</td> <td>-20A</td> </tr> <tr> <td><math>R_{DS(ON)}</math> (at <math>V_{GS} = -10V</math>)</td> <td>&lt; 17m<math>\Omega</math></td> </tr> <tr> <td><math>R_{DS(ON)}</math> (at <math>V_{GS} = -4.5V</math>)</td> <td>&lt; 30m<math>\Omega</math></td> </tr> </table> <div style="text-align: right;">  </div>	$V_{DS}$	-30V	$I_D$ (at $V_{GS} = -10V$ )	-20A	$R_{DS(ON)}$ (at $V_{GS} = -10V$ )	< 17m $\Omega$	$R_{DS(ON)}$ (at $V_{GS} = -4.5V$ )	< 30m $\Omega$
$V_{DS}$	-30V								
$I_D$ (at $V_{GS} = -10V$ )	-20A								
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$R_{DS(ON)}$ (at $V_{GS} = -4.5V$ )	< 30m $\Omega$								

DFN3.3x3.3



Part Number	Package Type	Form	Marking
TTG20P03ATC	DFN3.3x3.3	Tape & Reel	TTG20P03AT

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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>B</sup>	$I_D$	$T_C = 25^\circ\text{C}$	-17
		$T_C = 100^\circ\text{C}$	-13
Pulsed Drain Current <sup>A</sup>	$I_{DM}$	-80	A
Avalanche Current <sup>A</sup>	$I_{AS}$	22	A
Single Pulse Avalanche Energy $L = 0.3\text{mH}$ <sup>A</sup>	$E_{AS}$	72.6	mJ
Power Dissipation <sup>C</sup>	$P_D$	$T_C = 25^\circ\text{C}$	11.3
		$T_C = 100^\circ\text{C}$	4.5
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$

**Thermal Characteristics**

Parameter	Symbol	Maximum	Units
Maximum Junction-to-Case	$R_{\theta JC}$	11	$^\circ\text{C/W}$
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	$I_D = -250\mu\text{A}, V_{GS} = 0\text{V}$	-30			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = -30\text{V}, V_{GS} = 0\text{V}$	$T_J = 25^\circ\text{C}$		-1	$\mu\text{A}$
			$T_J = 125^\circ\text{C}$		-100	
$I_{GSS}$	Gate-Body Leakage Current	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$	-1	-1.6	-2.4	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = -10\text{V}, I_D = -20\text{A}$		14.5	17	$\text{m}\Omega$
		$V_{GS} = -4.5\text{V}, I_D = -20\text{A}$		23	30	$\text{m}\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = -5\text{V}, I_D = -4\text{A}$		21		S
$V_{SD}$	Diode Forward Voltage	$I_S = -10\text{A}, V_{GS} = 0\text{V}$			-1	V
$I_S$	Maximum Body-Diode Continuous Current <sup>B</sup>				-17	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{V}, V_{DS} = -15\text{V}, f = 1\text{MHz}$		1973		$\text{pF}$
$C_{oss}$	Output Capacitance			222		
$C_{rss}$	Reverse Transfer Capacitance			195		
$R_g$	Gate Resistance	$f = 1\text{MHz}$		5.4		$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS} = -10\text{V}, V_{DS} = -15\text{V}, I_D = -20\text{A}$		41		nC
$Q_g(4.5\text{V})$	Total Gate Charge			20		
$Q_{gs}$	Gate Source Charge			9		
$Q_{gd}$	Gate Drain Charge			6		
$t_{D(on)}$	Turn-On Delay Time	$V_{GS} = -10\text{V}, V_{DS} = -15\text{V}, I_D = -20\text{A}, R_G = 2.5\Omega$		9		ns
$t_r$	Turn-On Rise Time			10		
$t_{D(off)}$	Turn-Off Delay Time			50		
$t_f$	Turn-Off Fall Time			20		
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F = -10\text{A}, di/dt = 100\text{A}/\mu\text{s}$		24		ns
$Q_{rr}$	Body Diode Reverse Recovery Charge			16		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  $T_{J(MAX)} = 150^\circ\text{C}$ , 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

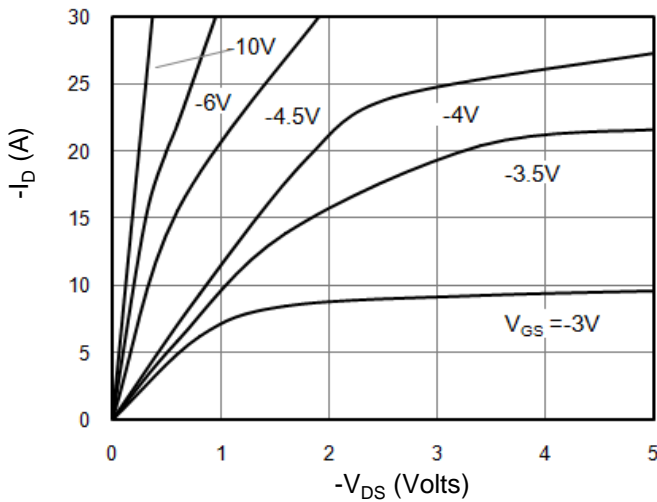


Figure 1: On-Region Characteristics

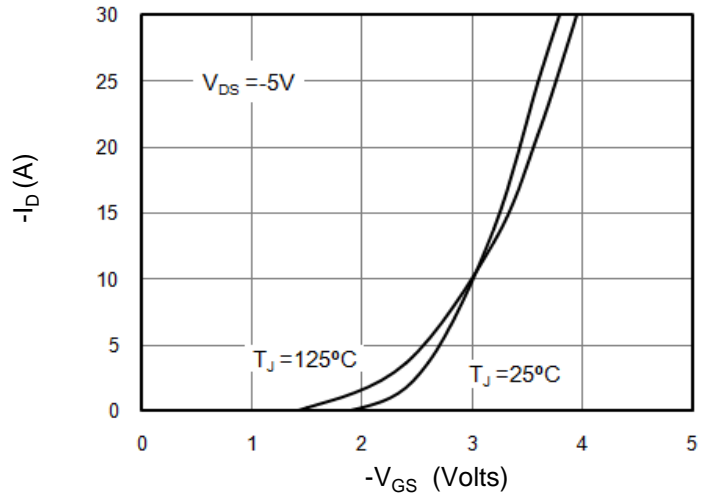


Figure 2: Transfer Characteristics

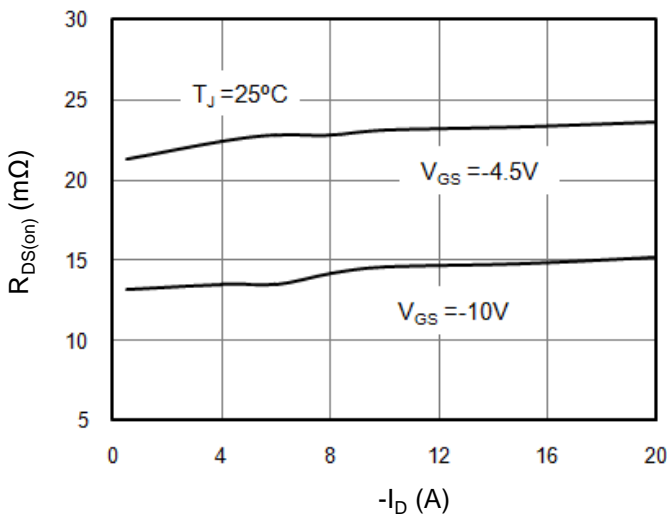


Figure 3: On-Resistance vs. Drain Current

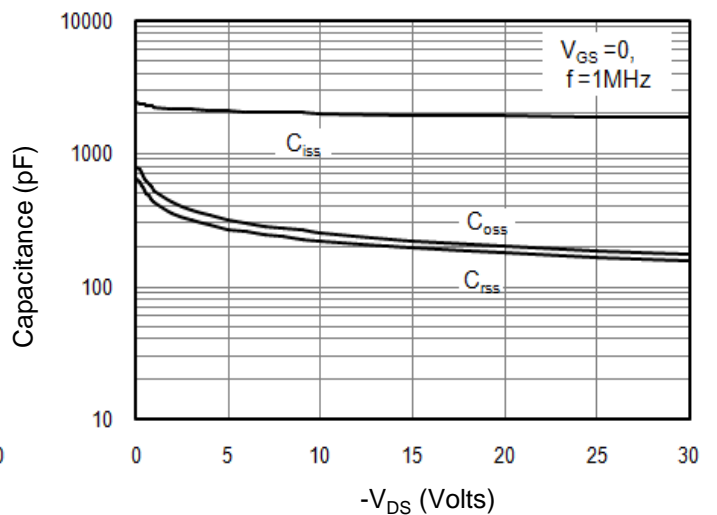


Figure 4: Capacitance Characteristics

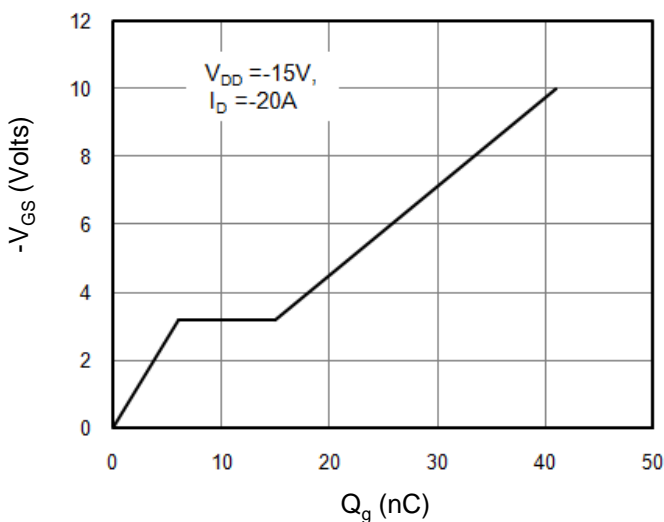


Figure 5: Gate Charge Characteristics

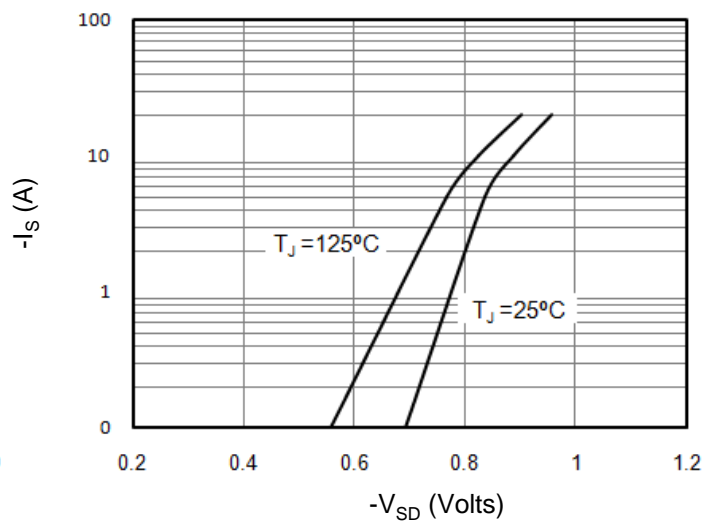


Figure 6: Body Diode Forward Voltage



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

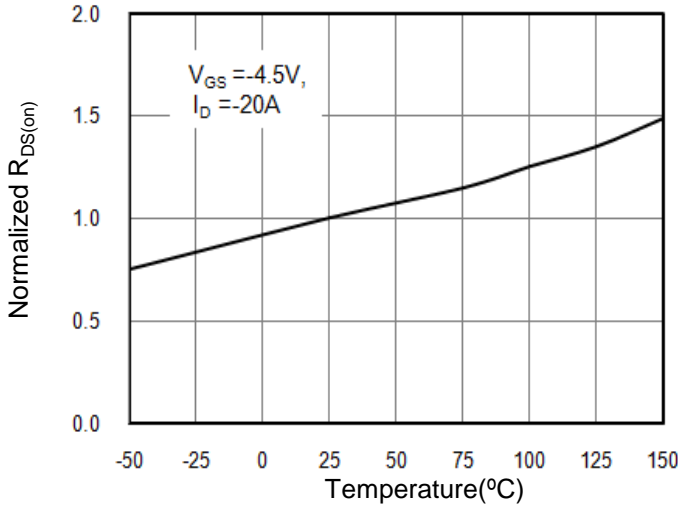


Figure 7: On-Resistance vs. Junction Temperature

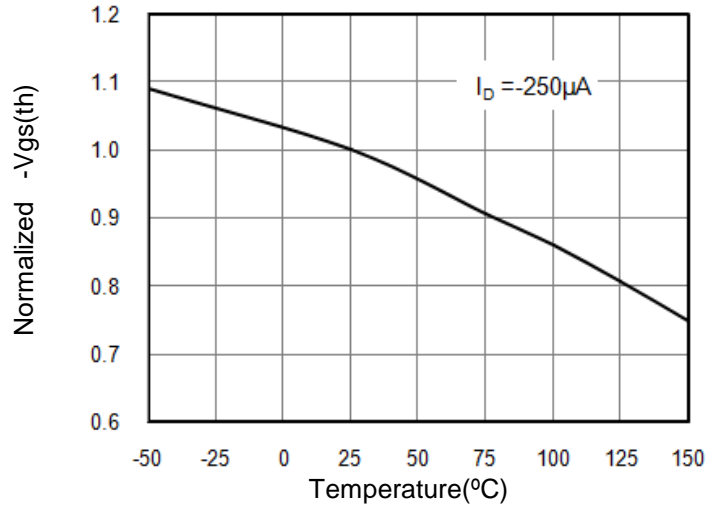


Figure 8: Vgs(th) vs. Junction Temperature

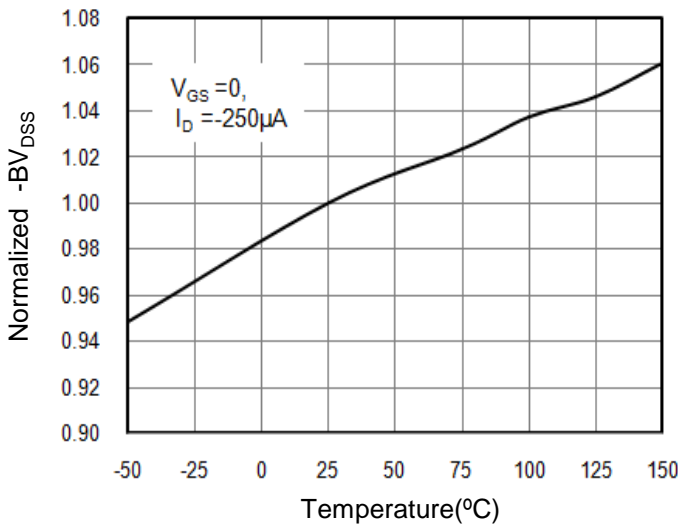


Figure 9: BV\_DS vs. Junction Temperature

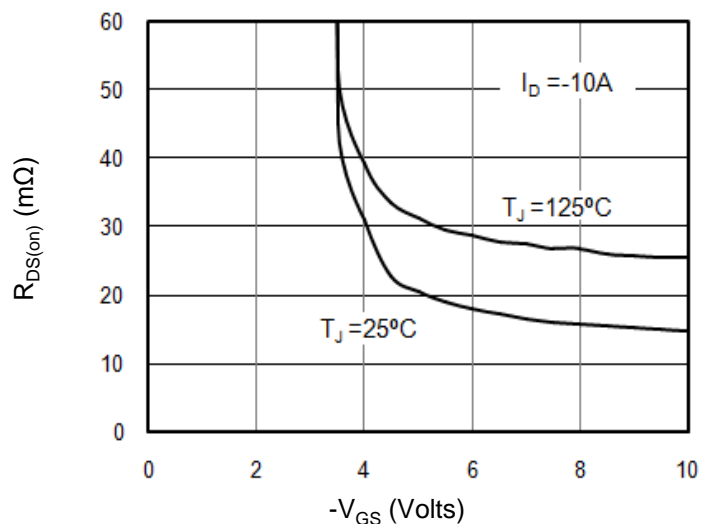


Figure 10: On-Resistance vs. Gate-Source Voltage

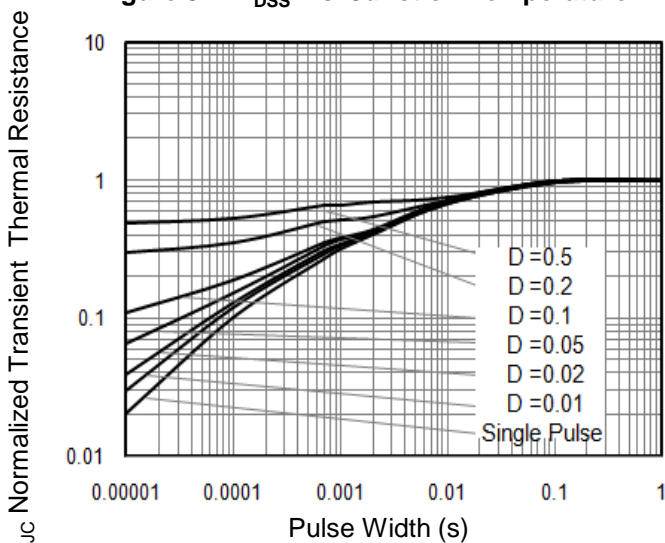


Figure 11: Normalized Transient Thermal Resistance

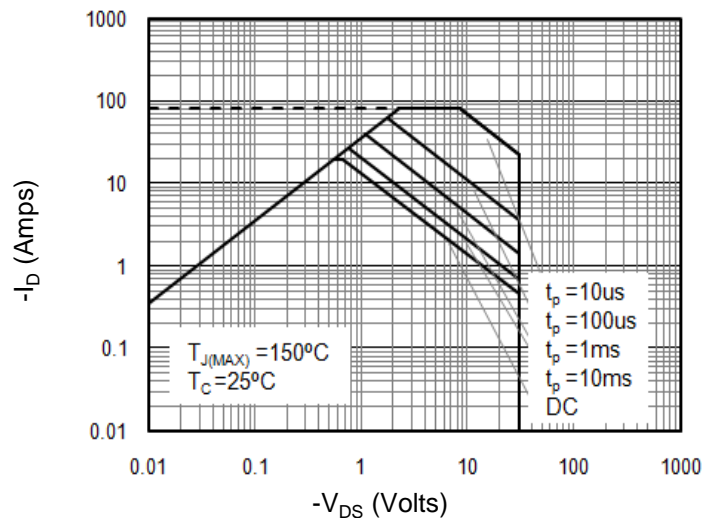


Figure 12: Safe Operating Area



Figure A: Gate Charge Test Circuit and Waveform

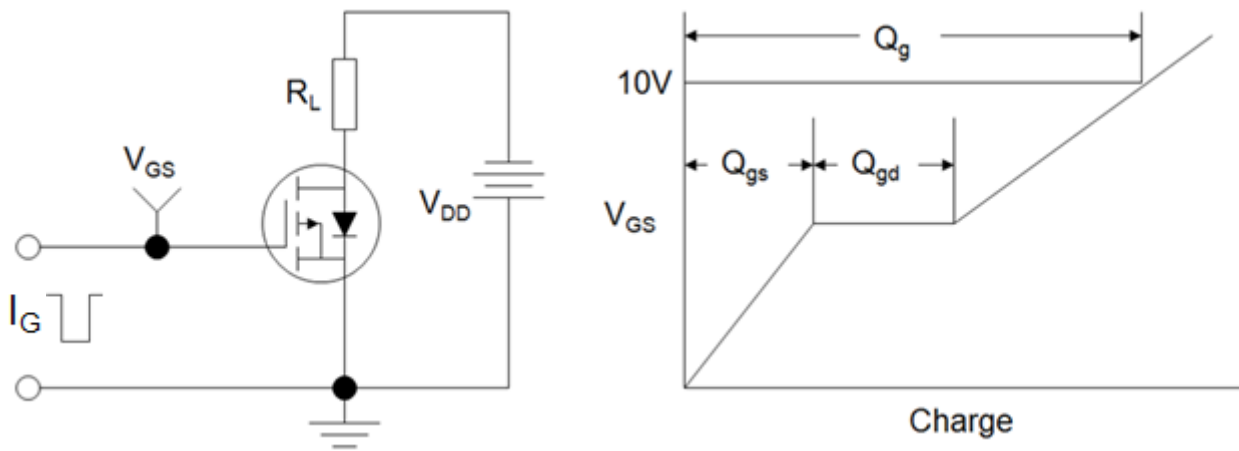


Figure B: Resistive Switching Test Circuit and Waveform

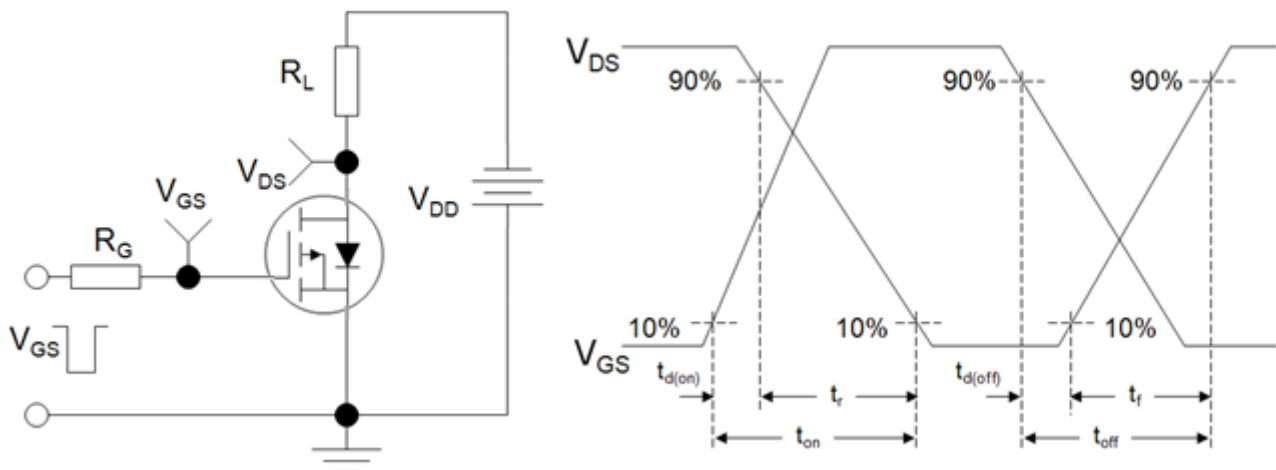
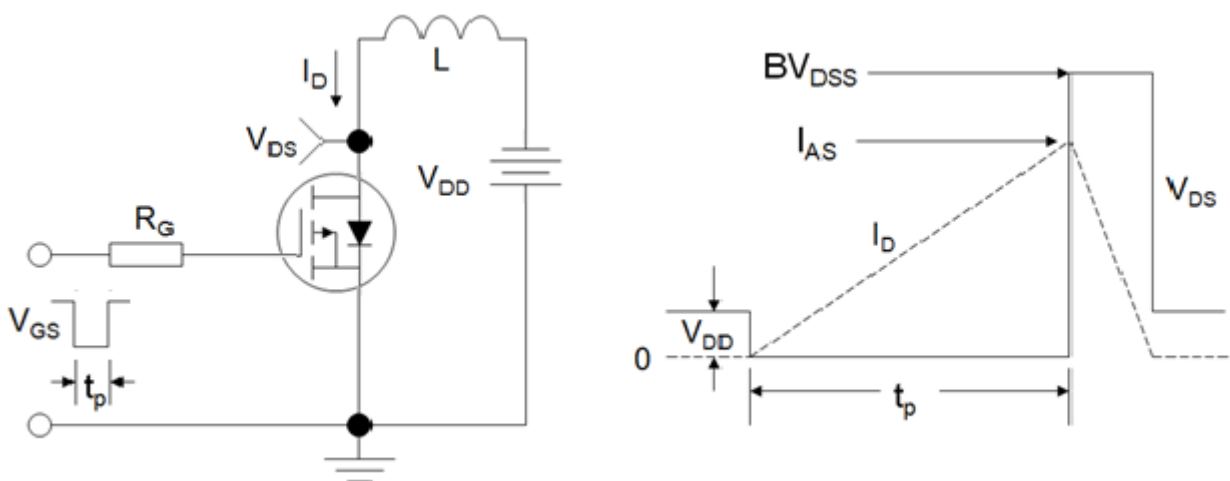
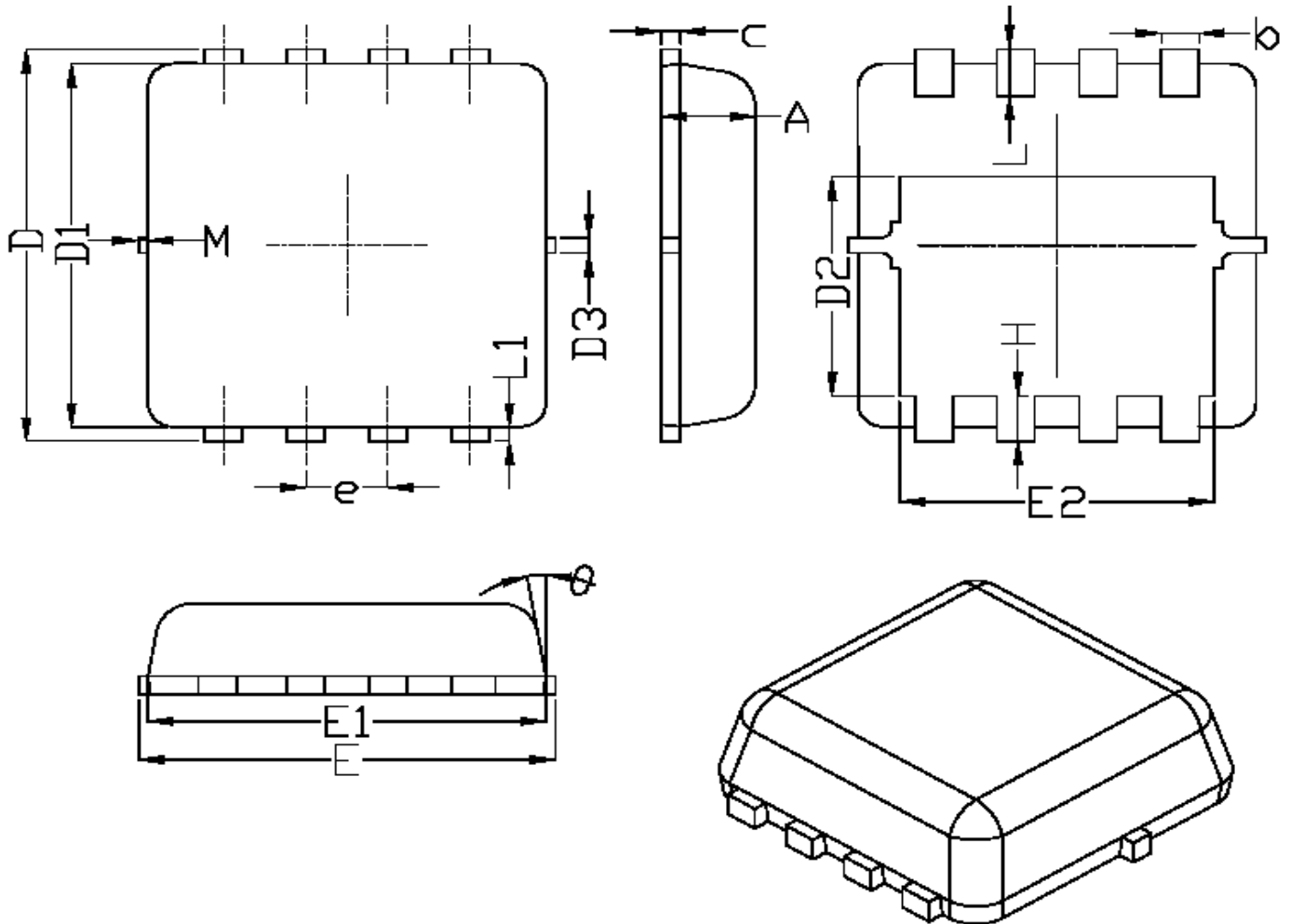


Figure C: Unclamped Inductive Switching Test Circuit and Waveform





### DFN3.3x3.3(捷敏)



SYMBOL	DIMENSIONAL REQMTS		
	MIN	NOM	MAX
A	0.70	0.75	0.80
b	0.25	0.30	0.35
c	0.10	0.15	0.25
D	3.25	3.35	3.45
D1	3.00	3.10	3.20
D2	1.78	1.88	1.98
D3	---	0.13	---
E	3.20	3.30	3.40
E1	3.00	3.15	3.20
E2	2.39	2.49	2.59
e	0.65BSC		
H	0.30	0.39	0.50
L	0.30	0.40	0.50
L1	---	0.13	---
$\theta$	---	10°	12°
M	*	*	0.15
* Not specified			



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