Wuxi Unigroup Microelectronics CO.,LTD.

20V P-Channel Trench MOSFET(Preliminary)

General Description

- Trench Power technology
- Low $R_{DS(ON)}$
- Low Gate Charge
- Optimized for fast-switching applications

Applications

- Synchronous Rectification in DC/DC and AC/DC Converters
- Isolated DC/DC Converters in Telecom and Industrial

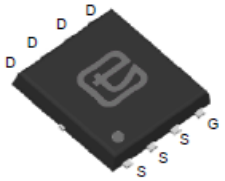
Product Summary

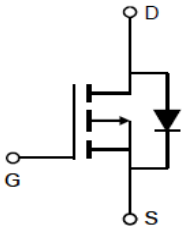
V_{DS}	-20V
I_D (at V_{GS}=10V)	-40A
$R_{DS(ON)}$ (at V_{GS}=-10V)	< 6.7mΩ
$R_{DS(ON)}$ (at V_{GS}=-4.5V)	< 8.1mΩ
$R_{DS(ON)}$ (at V_{GS}=-2.5V)	< 11.2mΩ

100% UIS Tested

RoHS

DFN3.3x3.3





Part Number	Package Type	Form	Marking
TTG40P02ATC	DFN3.3x3.3	Tape&Reel	40P02AT

Absolute Maximum Ratings (T_A =25°C unless otherwise noted)

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	- 20	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current [B]	T_C =25°C	I_D	-17	A
	T_C =100°C		-17	
Pulsed Drain Current [A]		I_{DM}	-120	A
Avalanche Current [A]		I_{AS}	-24	A
Single Pulse Avalanche Energy L =0.3mH [A]		E_{AS}	86.4	mJ
Power Dissipation [C]	T_C =25°C	P_D	29	W
	T_C =100°C		11.6	W
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	°C

Thermal Characteristics

Parameter		Symbol	Maximum	Units
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	4.3	°C/W
Maximum Junction-to-Ambient	Steady-State	$R_{\theta JA}$	100	

Electrical Characteristics(T_J =25ºC unless otherwise noted)

Symbol	Parameter	Conditions		Value			Units
				Min	Typ	Max	
STATIC PARAMETERS							
BV_{DSS}	Drain-Source Breakdown Voltage	I_D =-250μA,V_{GS} =0V		-20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} =-20V, V_{GS} =0V	T_J =25ºC			-1	μA
			T_J =100ºC			-100	
I_{GSS}	Gate-Body Leakage Current	V_{DS} =0V, V_{GS} =±20V				±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} =V_{GS}, I_D =-250μA		-0.1	-0.54	-1	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} =-10V, I_D =-40A			5.1	6.7	mΩ
		V_{GS} =-4.5V, I_D =-40A			6.2	8.1	mΩ
		V_{GS} =-2.5V, I_D =-40A			8.2	11.2	mΩ
g_{FS}	Forward Transconductance	V_{DS} =-5V, I_D =-20A			56		S
V_{SD}	Diode Forward Voltage	I_S =-20A, V_{GS} =0V				-1	V
I_S	Maximum Body-Diode Continuous Current [B]					-17	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS} =0V, V_{DS} =-10V, f =1MH_Z			6125		pF
C_{oss}	Output Capacitance				705		
C_{rss}	Reverse Transfer Capacitance				634		
SWITCHING PARAMETERS							
Q_g(10V)	Total Gate Charge	V_{GS} =-10V,V_{DS} =-10V, I_D =-20A			116		nC
Q_{gs}	Gate Source Charge				8		
Q_{gd}	Gate Drain Charge				12		
$t_{D(on)}$	Turn-On Delay Time	V_{GS} =-10V,V_{DS} =-10V, I_D =-20A, R_G =2.5Ω			20		ns
t_r	Turn-On Rise Time				34		
$T_{D(off)}$	Turn-Off Delay Time				138		
t_f	Turn-Off Fall Time				63		
t_{rr}	Body Diode Reverse Recovery Time	I_F =-20A, di/dt =100A/μs			33		ns
Q_{rr}	Body Diode Reverse Recovery Charge				100		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 $T_{J(MAX)}$ =150ºC, 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

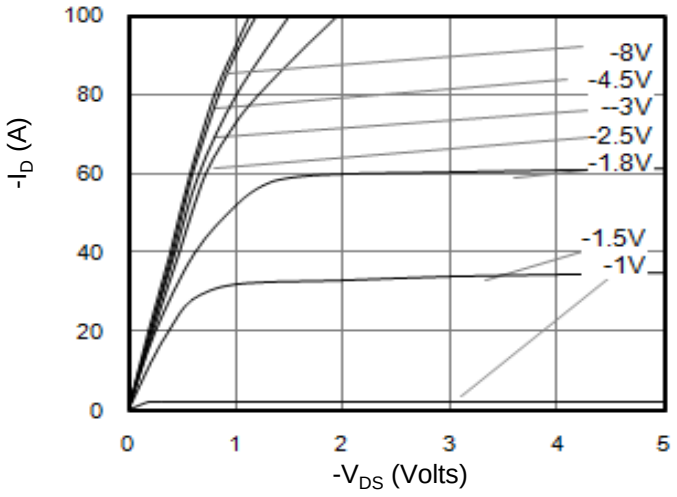


Figure 1: On-Region Characteristics

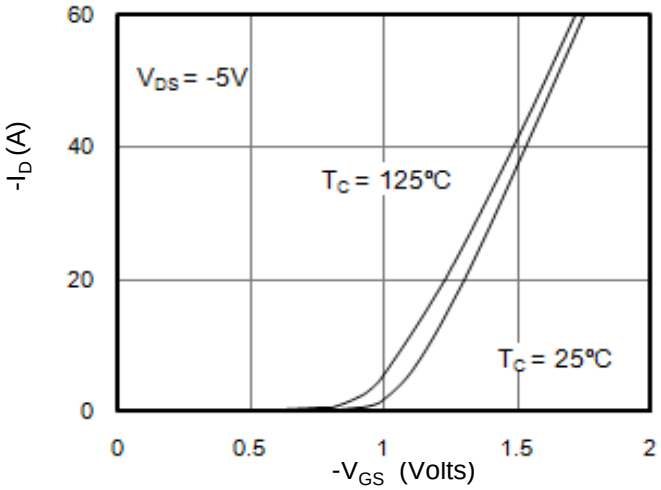


Figure 2: Transfer Characteristics

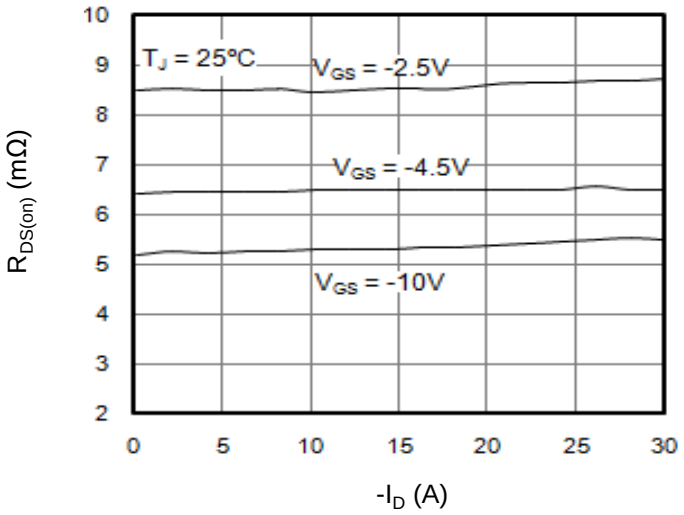


Figure 3: On-Resistance vs. Drain Current

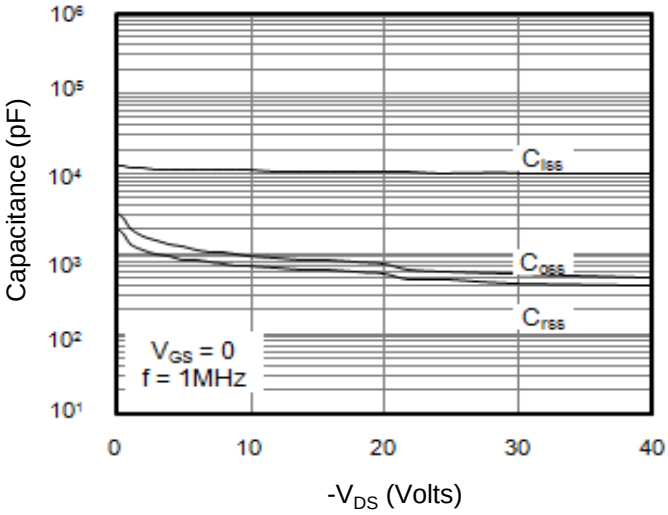


Figure 4: Capacitance Characteristics

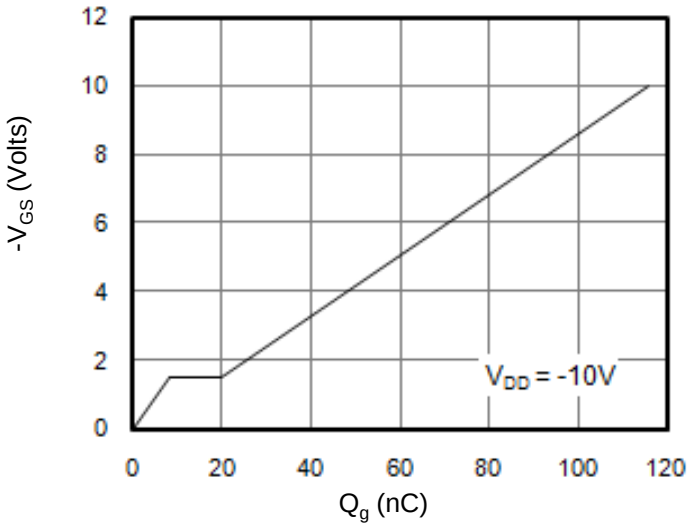


Figure 5: Gate Charge Characteristics

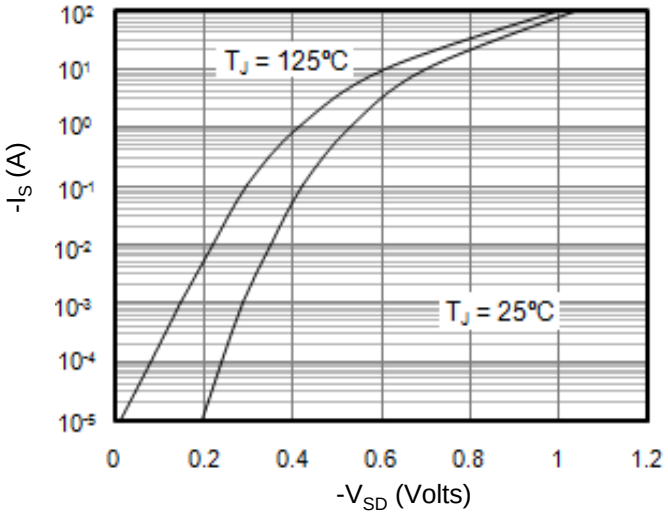


Figure 6: Body Diode Forward Voltage

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

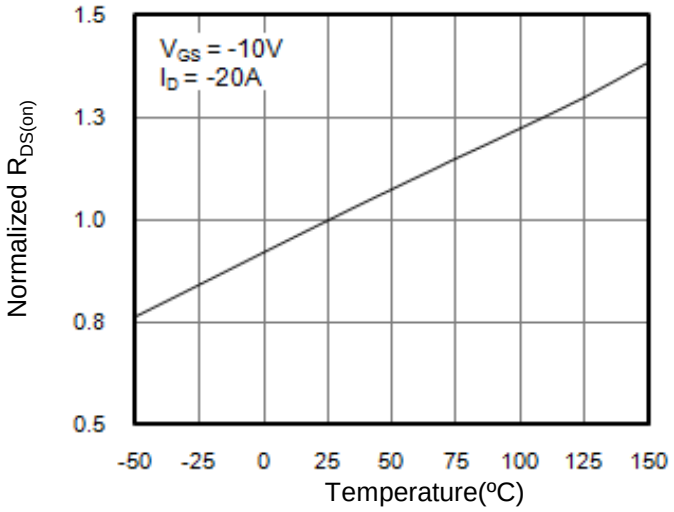


Figure 7: On-Resistance vs. Junction Temperature

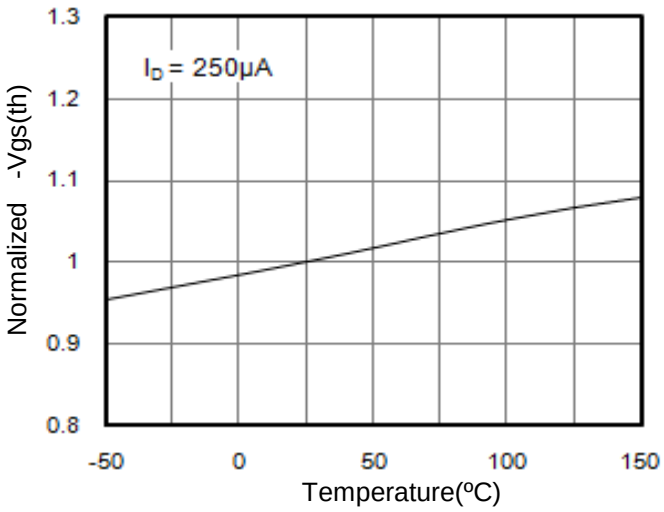


Figure 8: Vgs(th) vs. Junction Temperature

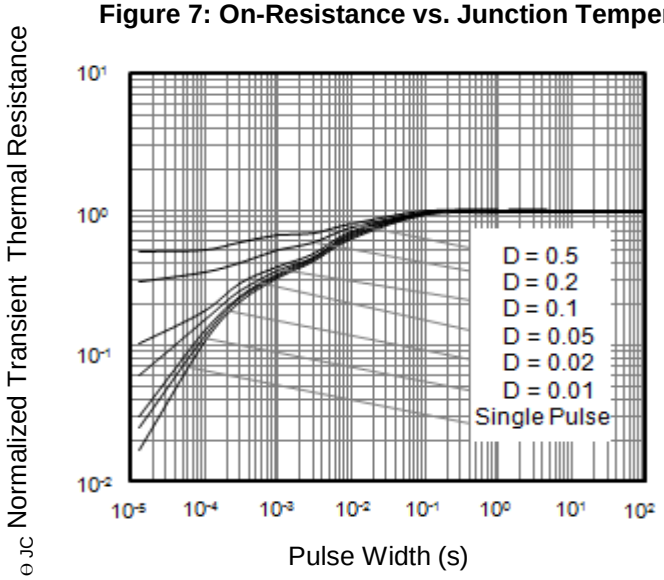


Figure 11: Normalized Transient Thermal Resistance

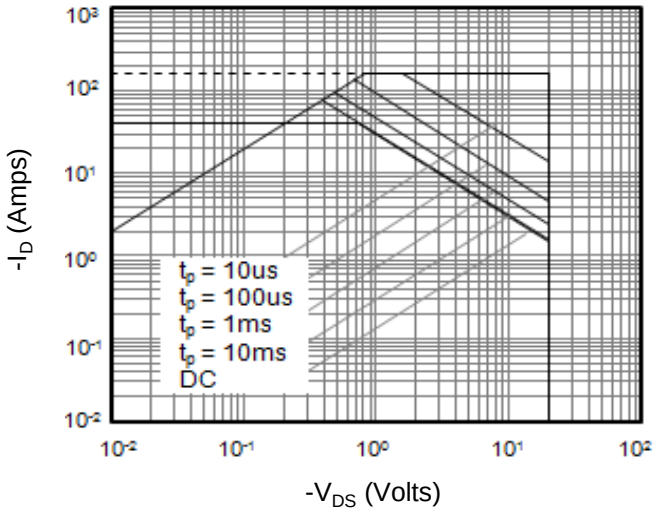


Figure 12: Safe Operating Area

Figure A：Gate Charge Test Circuit and Waveform

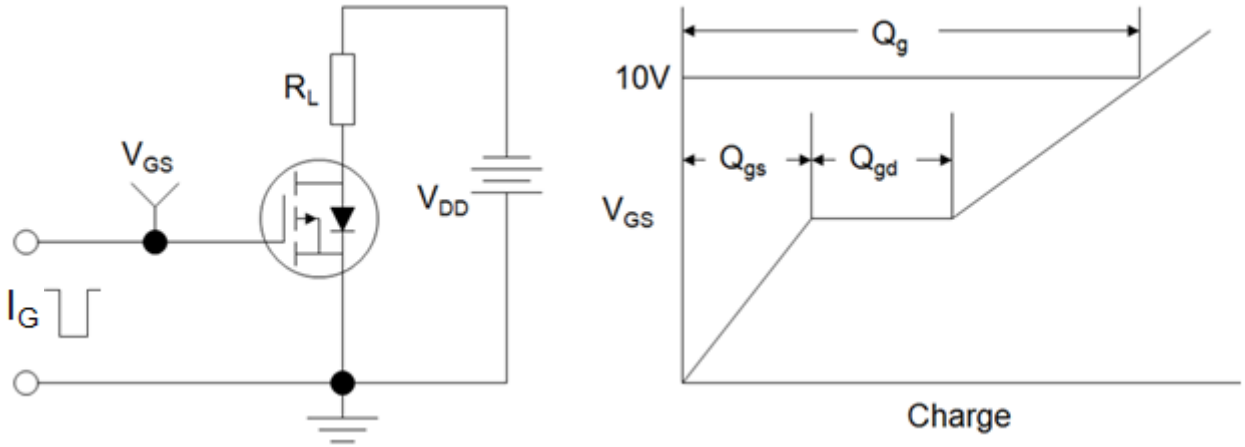


Figure B：Resistive Switching Test Circuit and Waveform

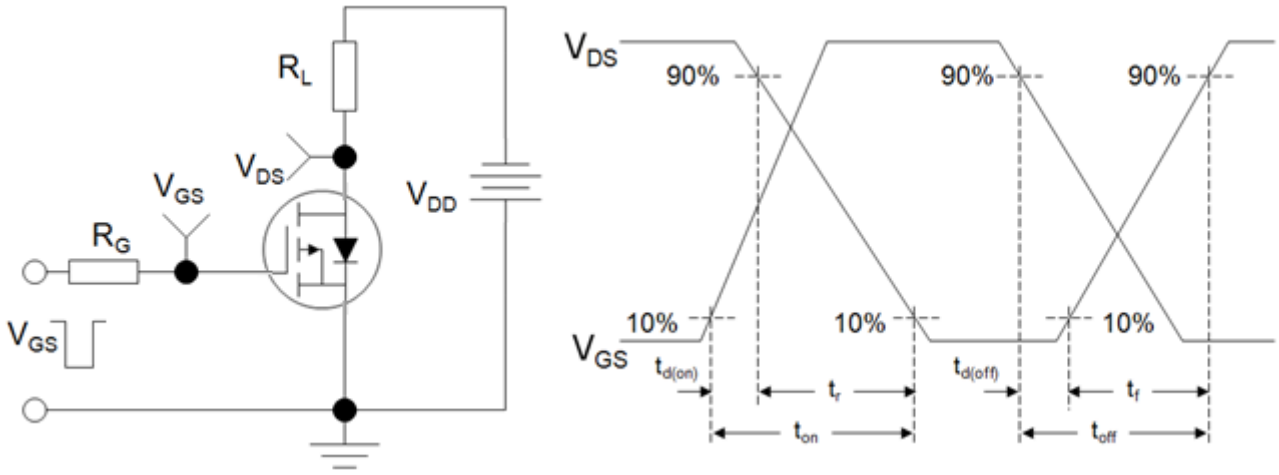
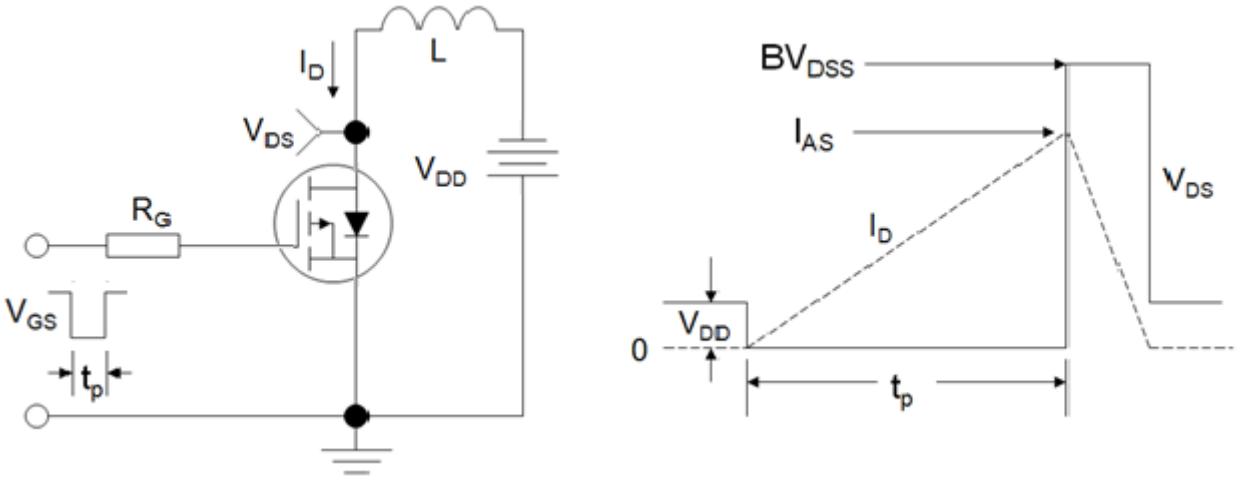
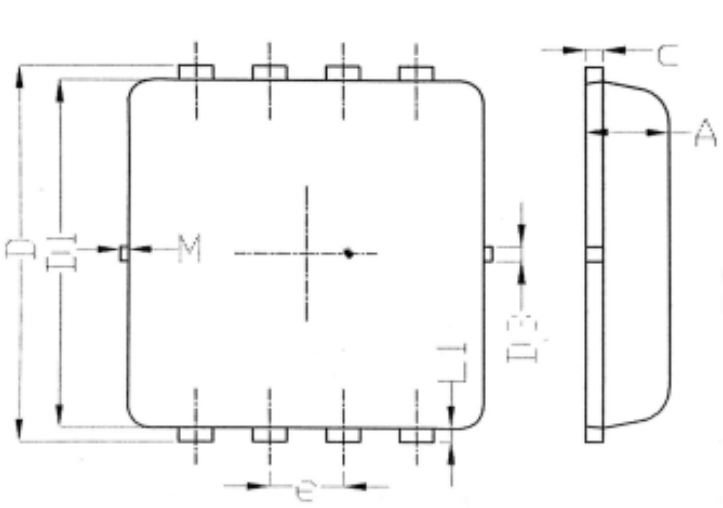
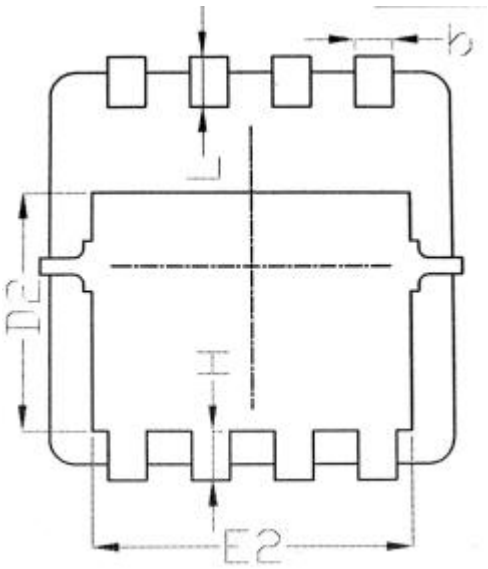


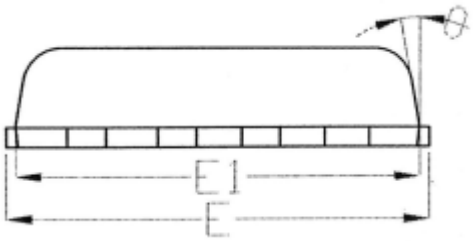
Figure C：Unclamped Inductive Switching Test Circuit and Waveform

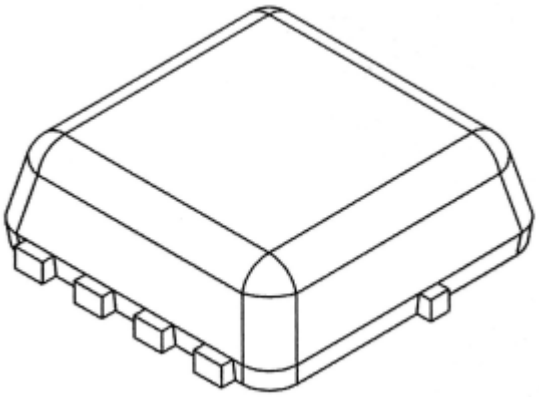


DFN3.3×3.3(捷敏)



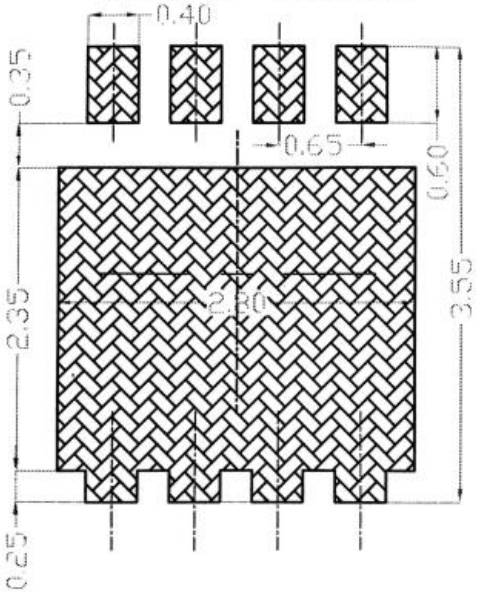






SYMBOL	DIMENSIONAL REQMTS		
	MIN	NOM	MAX
A	0.70	0.75	0.80
b	0.25	0.30	0.35
c	0.10	0.15	0.25
D	3.25	3.35	3.45
D1	3.00	3.10	3.20
D2	1.78	1.88	1.98
D3	---	0.13	---
E	3.20	3.30	3.40
E1	3.00	3.15	3.20
E2	2.39	2.49	2.59
e	0.65BSC		
H	0.30	0.39	0.50
L	0.30	0.40	0.50
L1	---	0.13	---
θ	---	10°	12°
M	*	*	0.15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

Land Pattern
(Only for Reference)



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