Wuxi Unigroup Microelectronics Company

20V P-Channel Trench MOSFET

Features

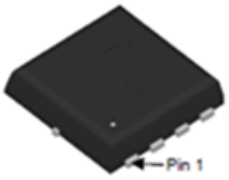
- Trench Power Technology
- Low $R_{DS(ON)}$
- Low Gate Charge
- Optimized for Fast-switching Applications

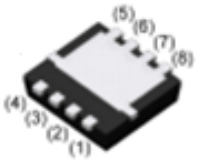
Applications

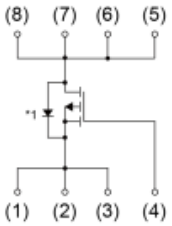
- Synchronous Rectification in DC/DC and AC/DC Converters
- Isolated DC/DC Converters in Telecom and Industrial

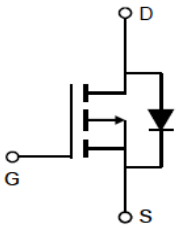
Product Summary

V_{DS}	-20V
$R_{DS(ON)}$ (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
I_D (at V_{GS}=10V)	-40A
100% UIS Tested	RoHS









Device	Package	Marking
TTG40P02ATC	DFN3x3	40P02AT

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted

Parameter		Symbol	Value	Unit
Drain-Source Voltage (V_{GS} = 0V)		V_{DSS}	-20	V
Continuous Drain Current	T_C = 25ºC	I_D	-40	A
	T_C = 100ºC		-24	
Pulsed Drain Current (note1)		I_{DM}	-160	A
Gate-Source Voltage		V_{GSS}	±12	V
Single Pulse Avalanche Energy (note2)		E_{AS}	86.4	mJ
Avalanche Current		I_{As}	-24	A
Power Dissipation (note3)	T_C = 25ºC	P_D	29	W
	T_C = 100ºC		11.6	W
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55~+150	ºC

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	R_{thJC}	4.3	ºC/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	60	

Specifications T_J = 25ºC, unless otherwise noted

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = -250μA	-20	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = -20V, V_{GS} = 0V, T_J = 25ºC	--	--	-1	μA
		V_{DS} = -20V, V_{GS} = 0V, T_J = 150ºC	--	--	-100	
Gate-Source Leakage	I_{GSS}	V_{GS} = ±12V	--	--	±100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = -250μA	-0.1	-0.54	-1	V
Drain-Source On-Resistance (Note3)	$R_{DS(on)}$	V_{GS} = -10V, I_D = -20A	--	5.1	6.7	mΩ
		V_{GS} = -4.5V, I_D = -20A	--	6.2	8.1	mΩ
		V_{GS} = -2.5V, I_D = -20A	--	8.6	11.2	mΩ
Forward Transconductance (Note3)	g_{fs}	V_{DS} = -5V, I_D = -20A	--	56	--	S
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = -10V, f = 1.0MHz	--	6125	--	pF
Output Capacitance	C_{oss}		--	705	--	
Reverse Transfer Capacitance	C_{rss}		--	634	--	
Total Gate Charge	Q_g	V_{DD} = -10V, I_D = -20A, V_{GS} = -10V	--	116	--	nC
Gate-Source Charge	Q_{gs}		--	8	--	
Gate-Drain Charge	Q_{gd}		--	12	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = -10V, I_D = -20A, R_G = 2.5Ω	--	20	--	ns
Turn-on Rise Time	t_r		--	34	--	
Turn-off Delay Time	$t_{d(off)}$		--	138	--	
Turn-off Fall Time	t_f		--	63	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	T_C = 25ºC	--	--	-40	A
Pulsed Diode Forward Current	I_{SM}		--	--	-160	
Body Diode Voltage	V_{SD}	T_J = 25ºC, I_{SD} = -20A, V_{GS} = 0V	--	--	-1.2	V
Reverse Recovery Time	t_{rr}	I_F = -20A, di_F/dt = 500A/μs	--	33	--	ns
Reverse Recovery Charge	Q_{rr}		--	100	--	nC

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. I_{AS} = -24A ,V_{DD} = 20V, R_G = 25Ω, Starting T_J = 25°C
3. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 1%

Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 1. Output Characteristics

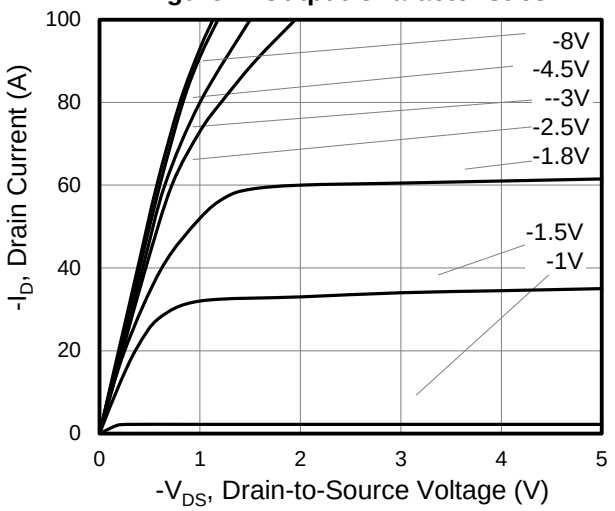


Figure 2. Transfer Characteristics

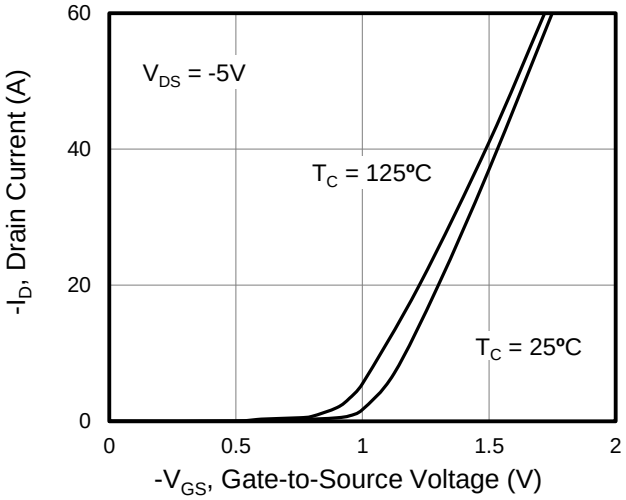


Figure 3. On-Resistance vs. Drain Current

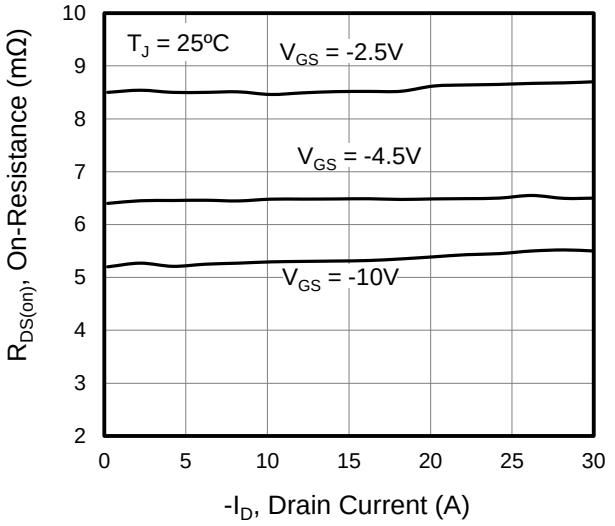


Figure 4. Capacitance

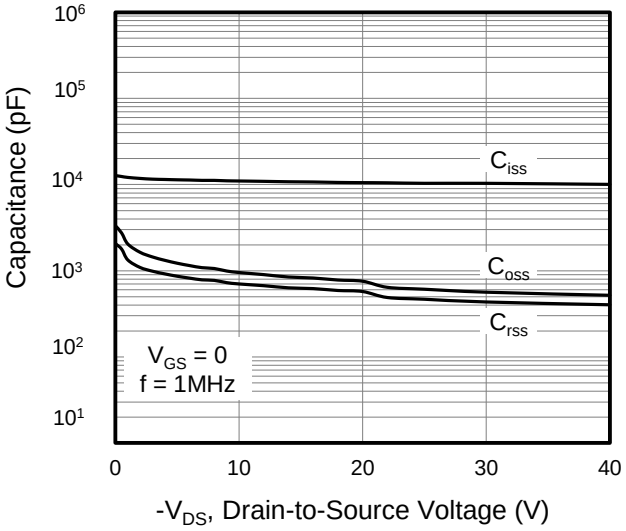


Figure 5. Gate Charge

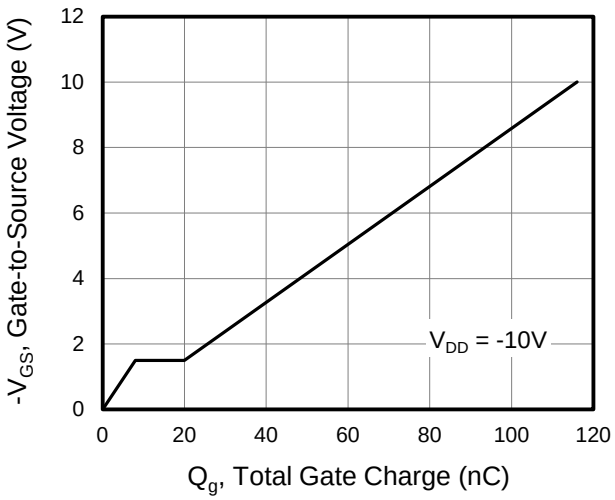
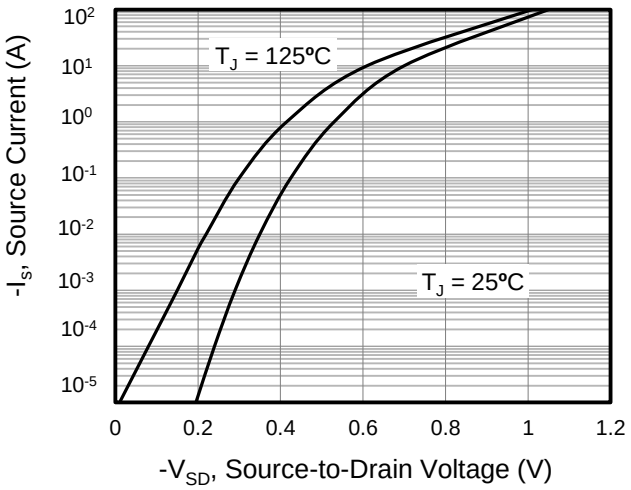


Figure 6. Body Diode Forward Voltage



Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 7. On-Resistance vs. Junction Temperature

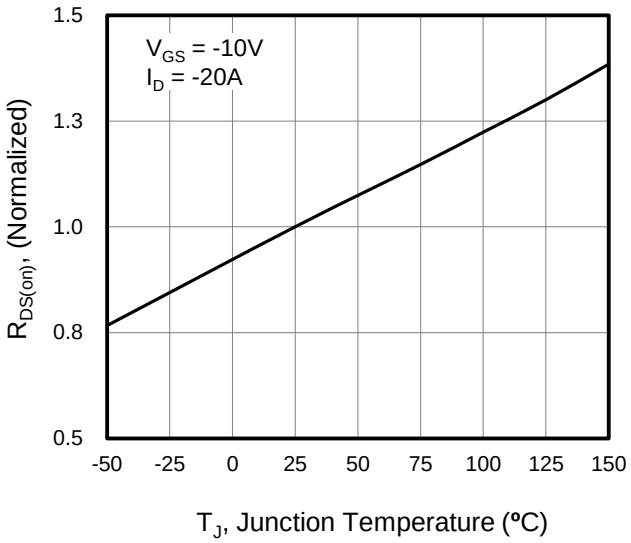


Figure 8. Breakdown voltage vs. Junction Temperature

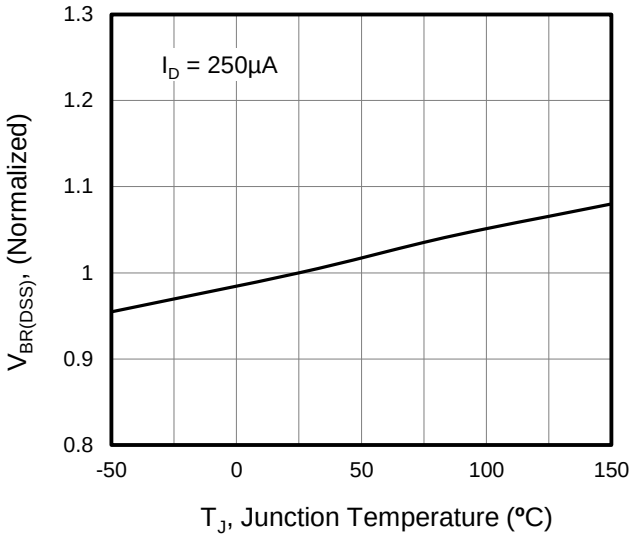


Figure 9. Transient Thermal Impedance

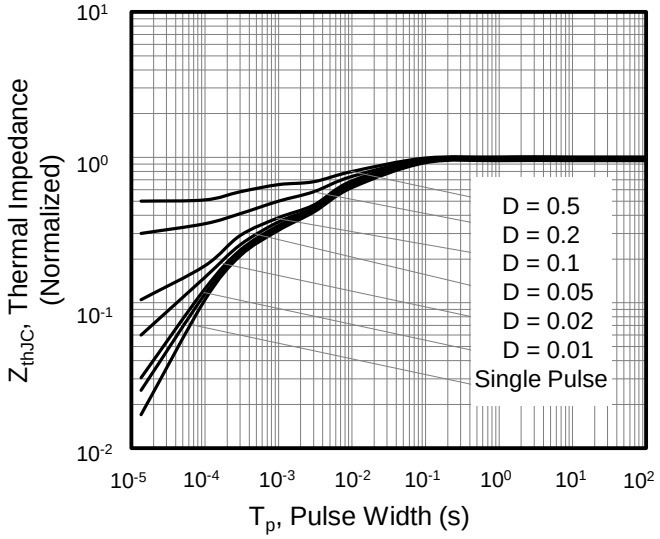


Figure 10. Safe operation area for

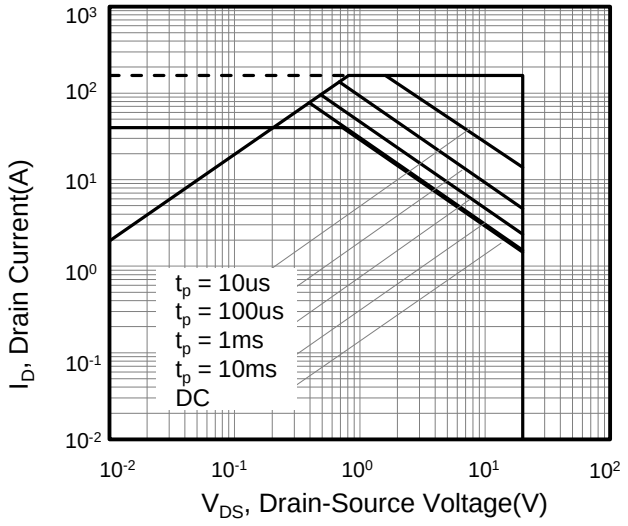


Figure A：Gate Charge Test Circuit and Waveform

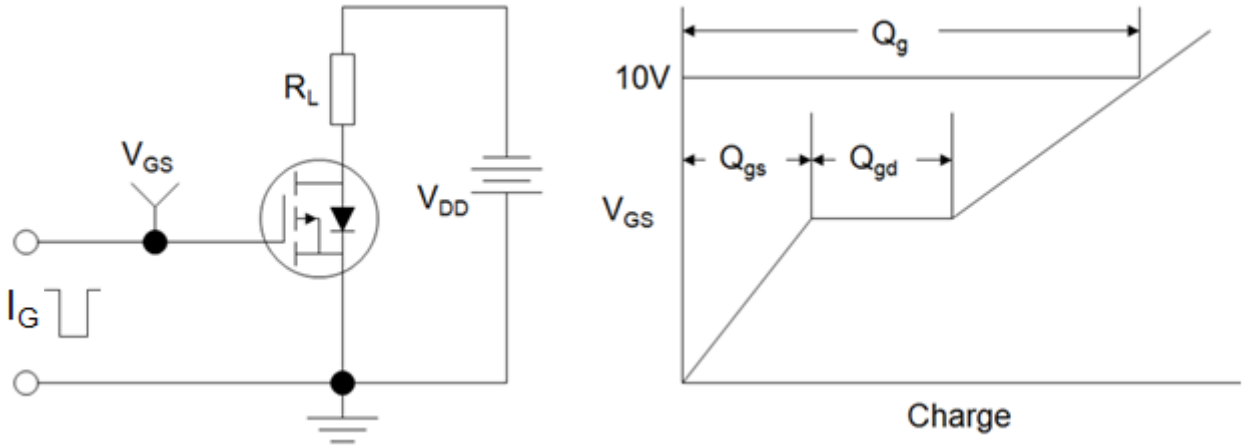


Figure B：Resistive Switching Test Circuit and Waveform

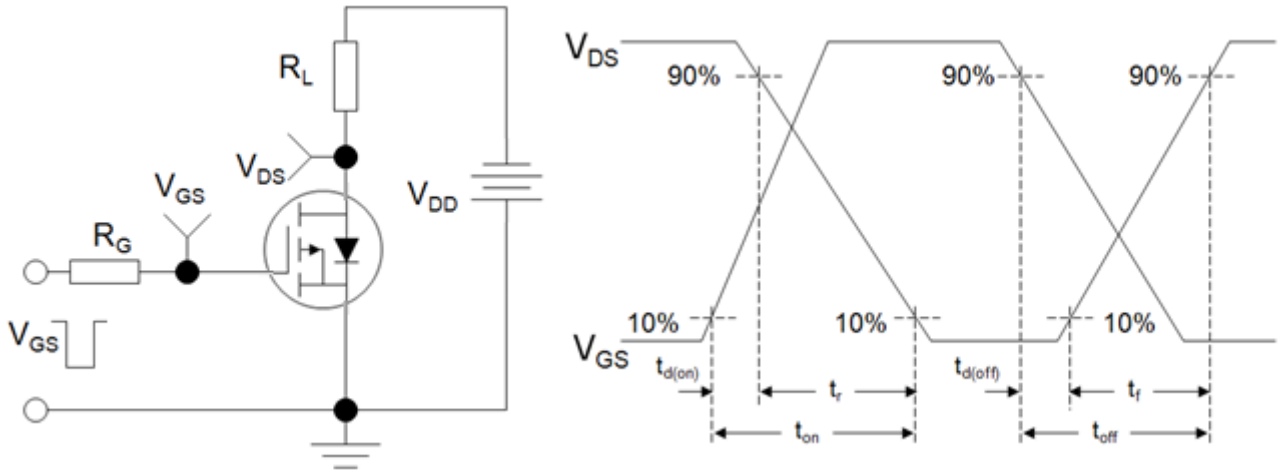
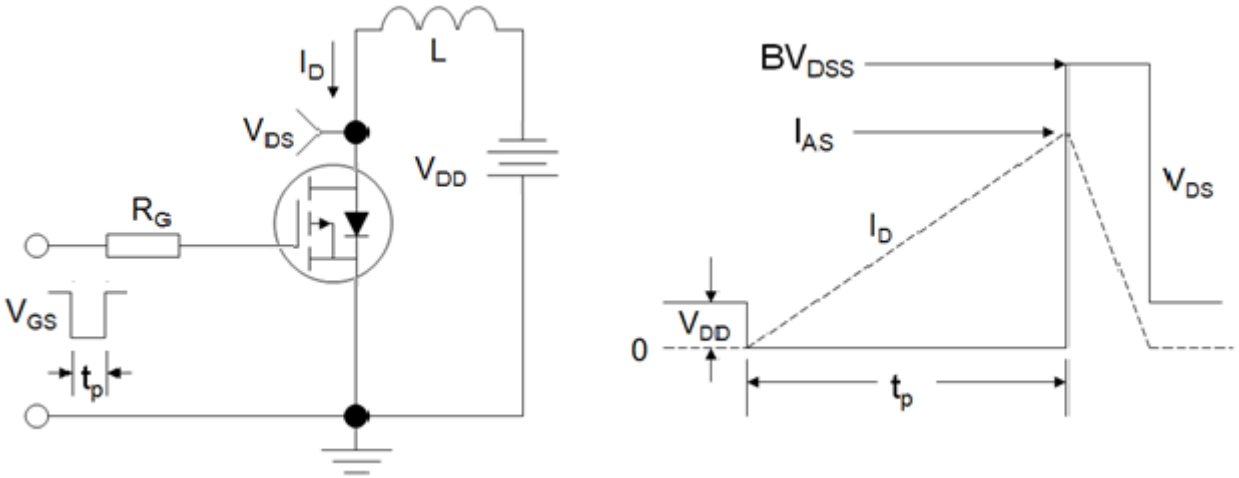
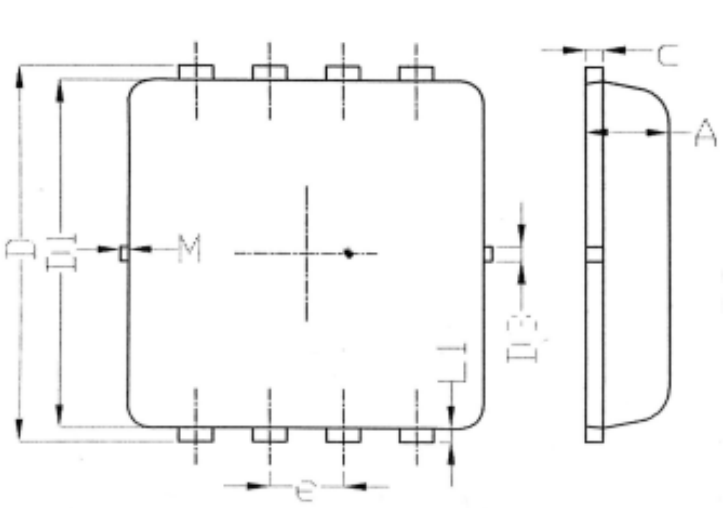
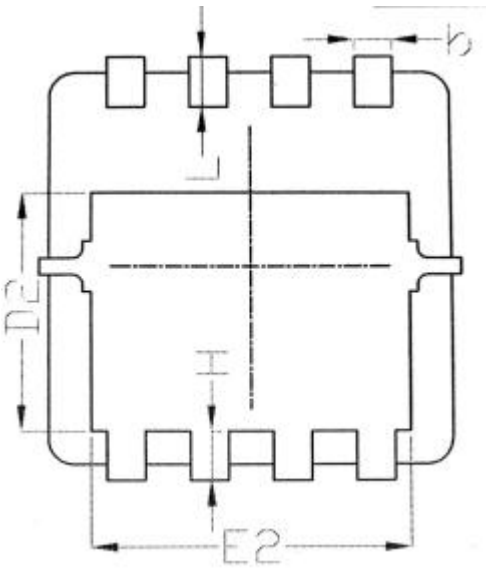


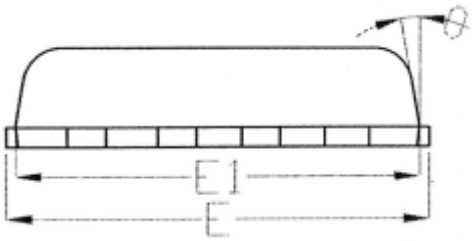
Figure C：Unclamped Inductive Switching Test Circuit and Waveform

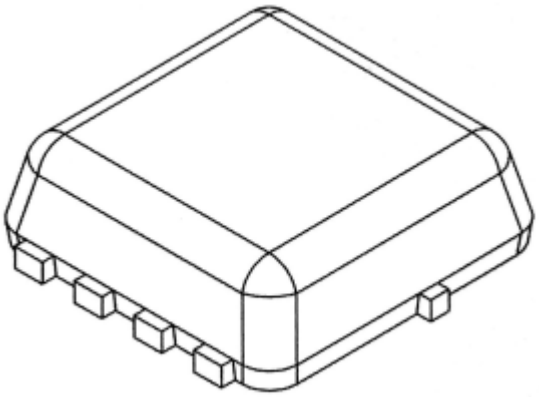


DFN3x3



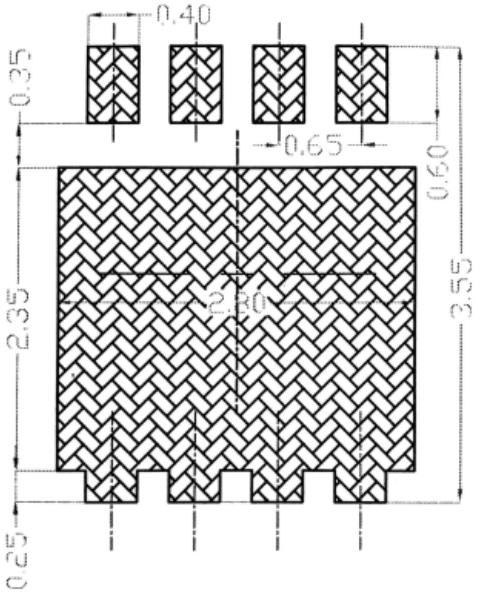






SYMBOL	DIMENSIONAL REQMTS		
	MIN	NOM	MAX
A	0.70	0.75	0.80
b	0.25	0.30	0.35
c	0.10	0.15	0.25
D	3.25	3.35	3.45
D1	3.00	3.10	3.20
D2	1.78	1.88	1.98
D3	---	0.13	---
E	3.20	3.30	3.40
E1	3.00	3.15	3.20
E2	2.39	2.49	2.59
e	0.65BSC		
H	0.30	0.39	0.50
L	0.30	0.40	0.50
L1	---	0.13	---
θ	---	10°	12°
M	*	*	0.15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

Land Pattern
(Only for Reference)



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