

VBQG1201K Datasheet

N-Channel 200 V (D-S) MOSFET

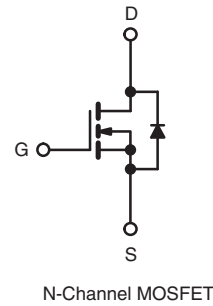
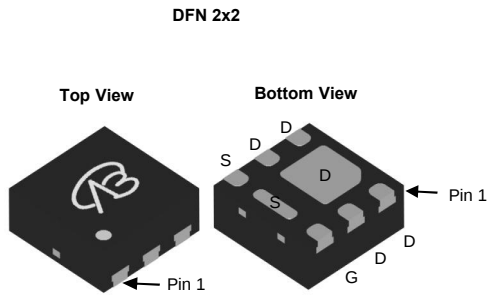
PRODUCT SUMMARY		
V_{DS} (V)	200	
$R_{DS(on)}$ (Ω)	$V_{GS} = 10\text{ V}$	1.2
Q_g (Max.) (nC)	8.2	
Q_{gs} (nC)	1.8	
Q_{gd} (nC)	4.5	
Configuration	Single	

FEATURES

- Available in tape and reel
- Dynamic dV/dt rating
- Repetitive avalanche rated
- Fast switching
- Ease of paralleling
- Simple drive requirements



RoHS
COMPLIANT
HALOGEN
FREE
Available



ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted)					
PARAMETER			SYMBOL	LIMIT	UNIT
Drain-Source Voltage			V _{DS}	200	V
Gate-Source Voltage			V _{GS}	± 20	
Continuous Drain Current	V _{GS} at 10 V	T _C = 25 °C	I _D	2.8	A
		T _C = 100 °C		2.0	
Pulsed Drain Current ^a			I _{DM}	8.4	W/°C
Linear Derating Factor				0.025	
Linear Derating Factor (PCB Mount) ^e				0.017	
Single Pulse Avalanche Energy ^b			E _{AS}	50	mJ
Repetitive Avalanche Current ^a			I _{AR}	0.96	A
Repetitive Avalanche Energy ^a			E _{AR}	0.31	mJ
Maximum Power Dissipation	T _C = 25 °C		P _D	3.1	W
Maximum Power Dissipation (PCB Mount) ^e	T _A = 25 °C			2.0	
Peak Diode Recovery dV/dt ^c			dV/dt	5.0	V/ns
Operating Junction and Storage Temperature Range			T _J , T _{stg}	-55 to +150	°C
Soldering Recommendations (Peak Temperature) ^d	for 10 s			300	

Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- $V_{DD} = 50\text{ V}$, starting $T_J = 25\text{ }^\circ\text{C}$, $L = 81\text{ mH}$, $R_G = 25\text{ }\Omega$, $I_{AS} = 0.96\text{ A}$ (see fig. 12).
- $I_{SD} \leq 3.3\text{ A}$, $dI/dt \leq 70\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DS}$, $T_J \leq 150\text{ }^\circ\text{C}$.
- 1.6 mm from case.
- When mounted on 1" square PCB (FR-4 or G-10 material).

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient (PCB Mount) ^a	R_{thJA}	-	-	40	°C/W
Maximum Junction-to-Case (Drain)	R_{thJC}	-	-	60	

Note

a. When mounted on 1" square PCB (FR-4 or G-10 material).

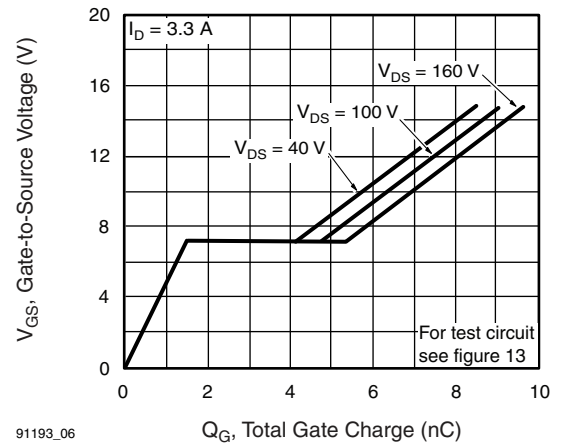
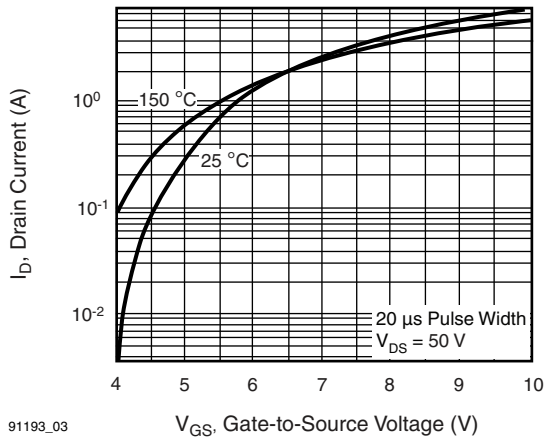
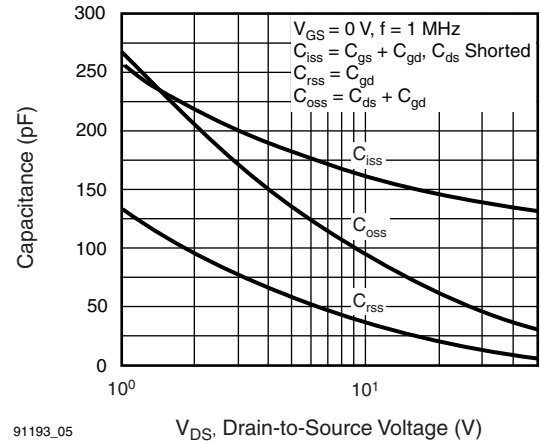
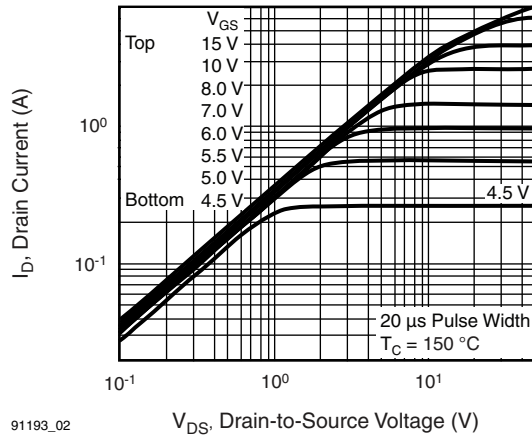
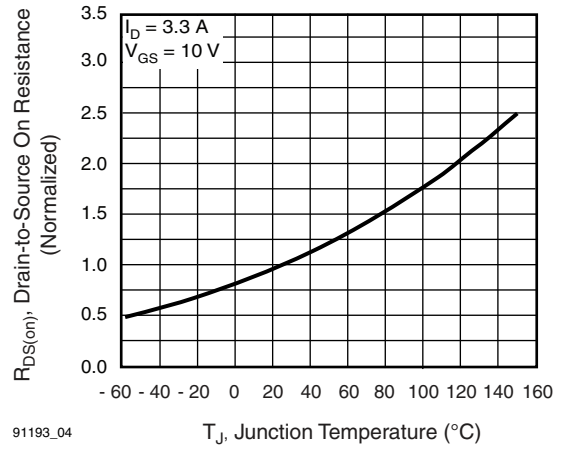
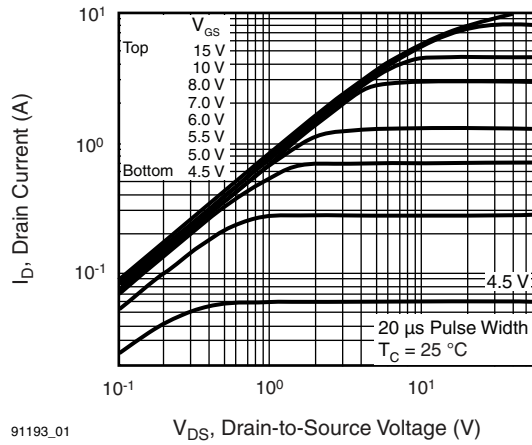
SPECIFICATIONS ($T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$		200	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^{\circ}\text{C}$, $I_D = 1\text{ mA}$		-	0.30	-	$\text{V}/^{\circ}\text{C}$
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$		2.0	-	4.0	V
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 20\text{ V}$		-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 200\text{ V}$, $V_{GS} = 0\text{ V}$		-	-	25	μA
		$V_{DS} = 160\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 125\text{ }^{\circ}\text{C}$		-	-	250	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$	$I_D = 0.58\text{ A}^b$	-	1.2	-	Ω
Forward Transconductance	g_{fs}	$V_{DS} = 50\text{ V}$, $I_D = 0.58\text{ A}$		0.51	-	-	S
Dynamic							
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1.0\text{ MHz}$, see fig. 5		-	140	-	pF
Output Capacitance	C_{oss}			-	53	-	
Reverse Transfer Capacitance	C_{rss}			-	15	-	
Total Gate Charge	Q_g	$V_{GS} = 10\text{ V}$	$I_D = 3.3\text{ A}$, $V_{DS} = 160\text{ V}$, see fig. 6 and 13 ^b	-	-	8.2	nC
Gate-Source Charge	Q_{gs}			-	-	1.8	
Gate-Drain Charge	Q_{gd}			-	-	4.5	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 100\text{ V}$, $I_D = 3.3\text{ A}$, $R_g = 24\text{ }\Omega$, $R_D = 30\text{ }\Omega$, see fig. 10 ^b		-	8.2	-	ns
Rise Time	t_r			-	17	-	
Turn-Off Delay Time	$t_{d(off)}$			-	14	-	
Fall Time	t_f			-	8.9	-	
Internal Drain Inductance	L_D	Between lead, 6 mm (0.25") from package and center of die contact		-	4.0	-	nH
Internal Source Inductance	L_S			-	6.0	-	
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode		-	-	2.8	A
Pulsed Diode Forward Current ^a	I_{SM}			-	-	8.4	
Body Diode Voltage	V_{SD}	$T_J = 25\text{ }^{\circ}\text{C}$, $I_S = 0.96\text{ A}$, $V_{GS} = 0\text{ V}^b$		-	-	2.0	V
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25\text{ }^{\circ}\text{C}$, $I_F = 3.3\text{ A}$, $dI/dt = 100\text{ A}/\mu\text{s}^b$		-	150	310	ns
Body Diode Reverse Recovery Charge	Q_{rr}			-	0.60	1.4	μC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L_S and L_D)					

Notes

a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).

b. Pulse width $\leq 300\text{ }\mu\text{s}$; duty cycle $\leq 2\%$.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)


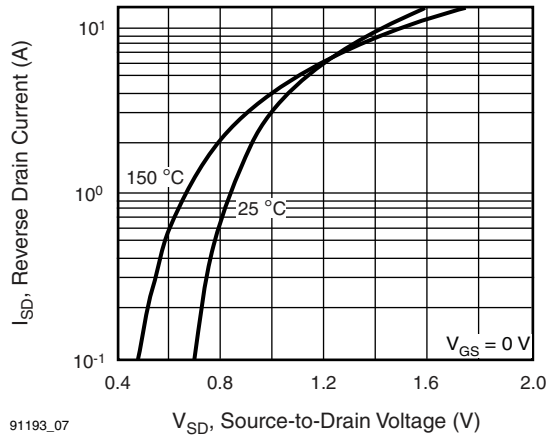


Fig. 7 - Typical Source-Drain Diode Forward Voltage

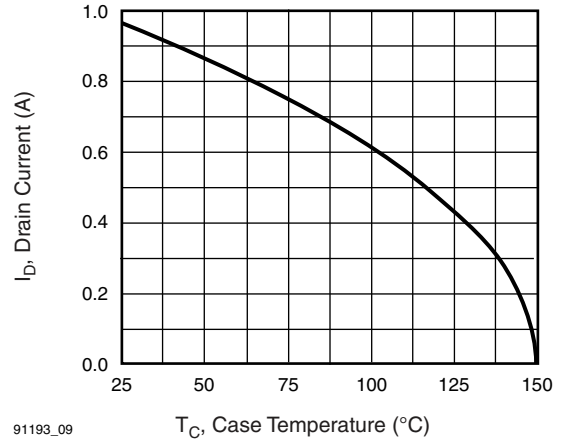


Fig. 9 - Maximum Drain Current vs. Case Temperature

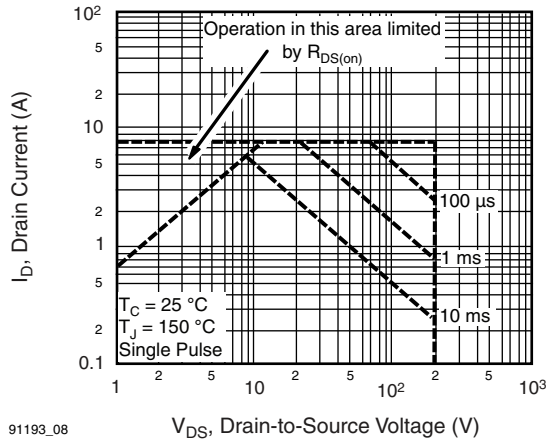


Fig. 8 - Maximum Safe Operating Area

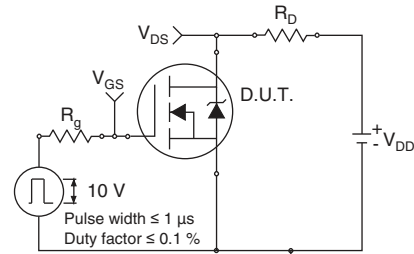


Fig. 10a - Switching Time Test Circuit

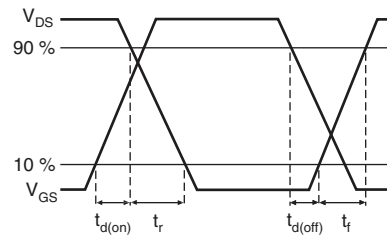


Fig. 10b - Switching Time Waveforms

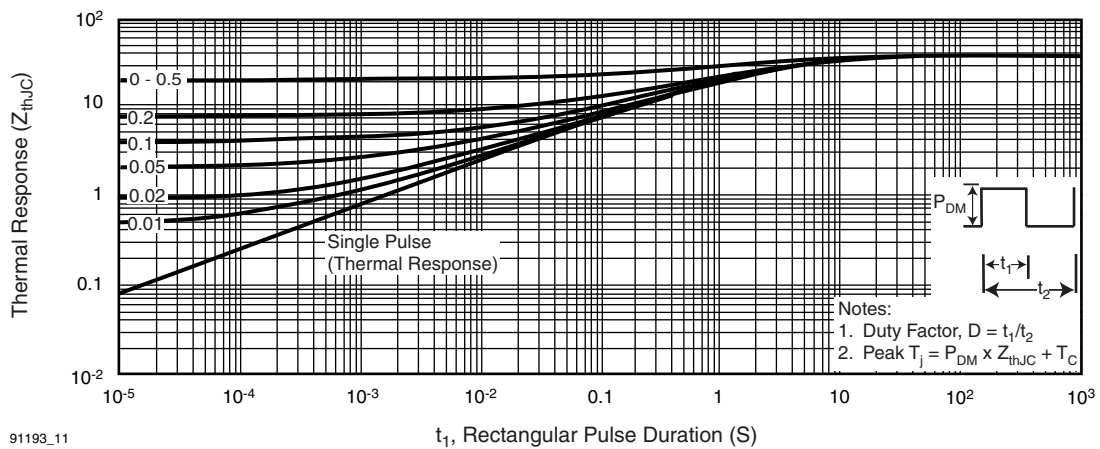


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

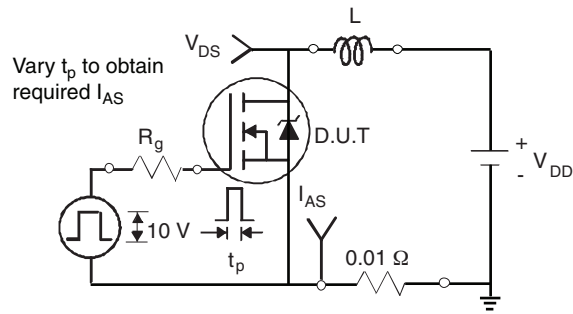


Fig. 12a - Unclamped Inductive Test Circuit

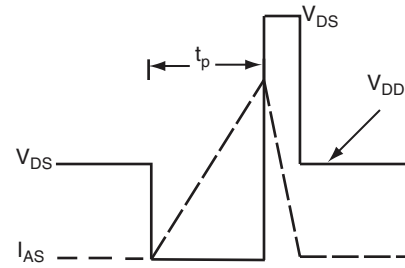


Fig. 12b - Unclamped Inductive Waveforms

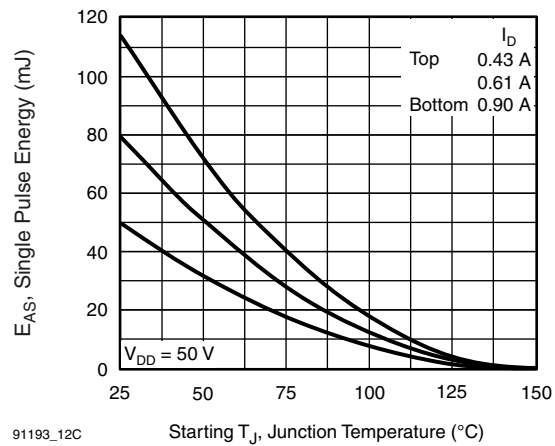


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

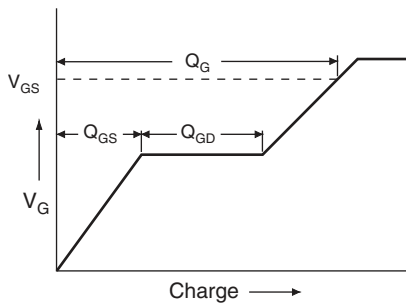


Fig. 13a - Basic Gate Charge Waveform

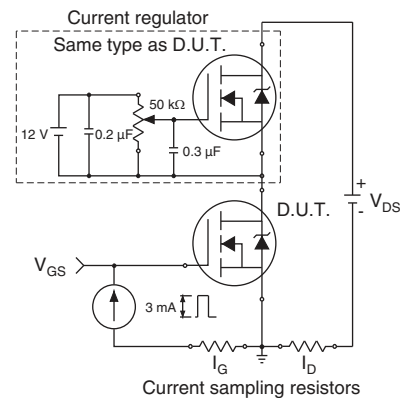
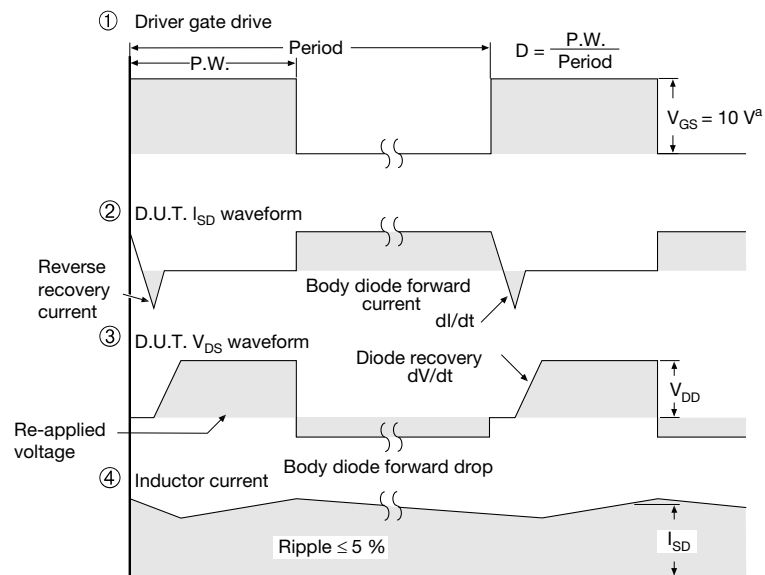
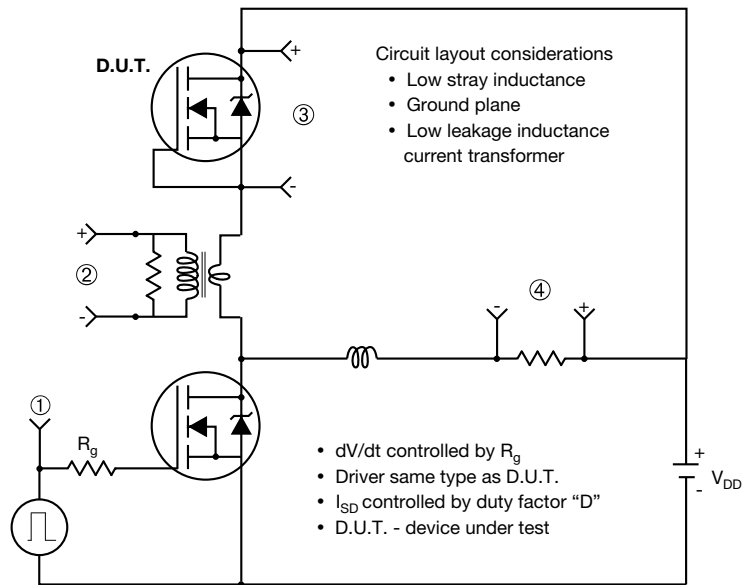


Fig. 13b - Gate Charge Test Circuit

Peak Diode Recovery dV/dt Test Circuit

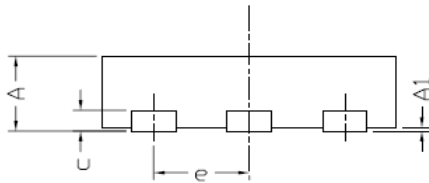
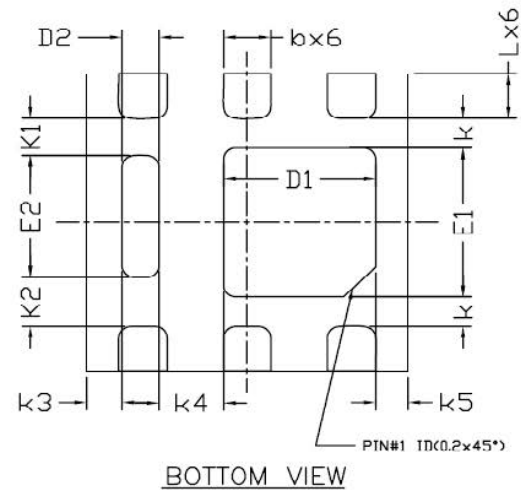
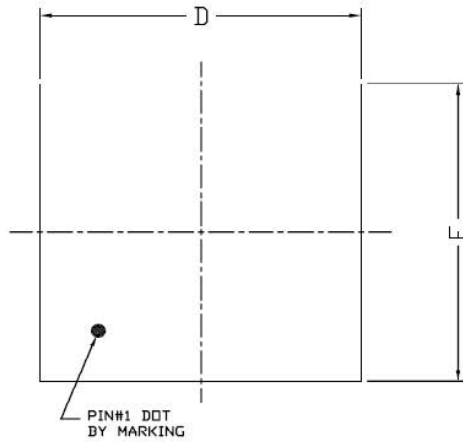


Note

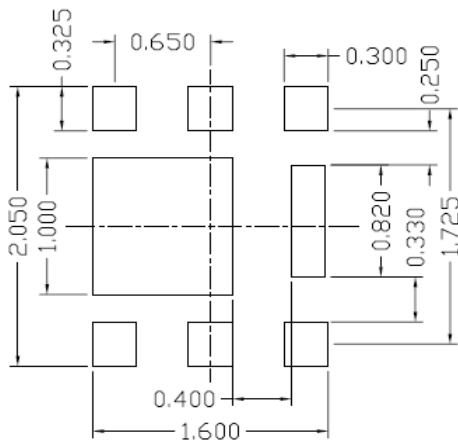
a. $V_{GS} = 5 V$ for logic level devices

Fig. 14 - For N-Channel

DFN2x2 _6L_EP1_S PACKAGE OUTLINE



RECOMMENDED LAND PATTERN



UNIT: mm

NOTE

1. CONTROLLING DIMENSION IS MILLIMETER.
CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.

SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.50	0.55	0.60	0.020	0.022	0.024
A1	0.00	—	0.05	0.000	—	0.002
b	0.25	0.30	0.35	0.010	0.012	0.014
c	0.152 REF			0.006 REF		
D	1.90	2.00	2.10	0.075	0.079	0.083
D1	0.85	0.95	1.05	0.033	0.037	0.041
D2	0.13	0.23	0.33	0.005	0.009	0.013
E	1.90	2.00	2.10	0.075	0.079	0.083
E1	0.90	1.00	1.10	0.035	0.039	0.043
E2	0.72	0.82	0.92	0.028	0.032	0.036
e	0.65 BSC			0.026 BSC		
K	0.20 BSC			0.008 BSC		
K1	0.25 BSC			0.010 BSC		
K2	0.33 BSC			0.013 BSC		
K3	0.22 BSC			0.009 BSC		
K4	0.40 BSC			0.016 BSC		
K5	0.20 BSC			0.008 BSC		
L	0.25	0.30	0.35	0.010	0.012	0.014

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