

NTP75N03-06, NTB75N03-06

Power MOSFET 75 Amps, 30 Volts N-Channel TO-220 and D2PAK

This 10 V_{GS} gate drive vertical Power MOSFET is a general purpose part that provides the “best of design” available today in a low cost power package. Avalanche energy issues make this part an ideal design in. The drain-to-source diode has a ideal fast but soft recovery.

Features

- Ultra-Low R_{DS(on)}, Single Base, Advanced Technology
- SPICE Parameters Available
- Diode is Characterized for Use in Bridge Circuits
- I_{DSS} and V_{DS(on)} Specified at Elevated Temperatures
- High Avalanche Energy Specified
- ESD JEDAC Rated HBM Class 1, MM Class B, CDM Class 0

Typical Applications

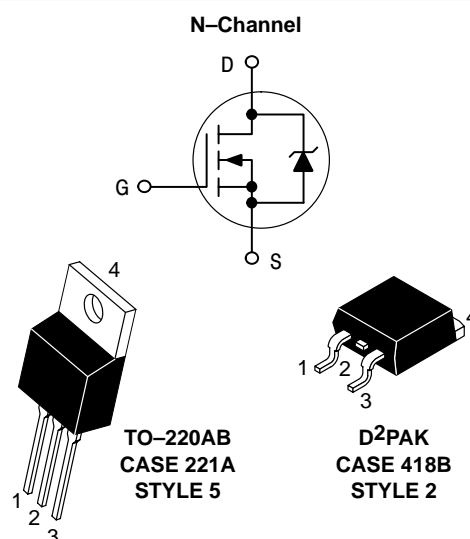
- Power Supplies
- Inductive Loads
- PWM Motor Controls
- Replaces MTP1306 and MTB1306 in Many Applications



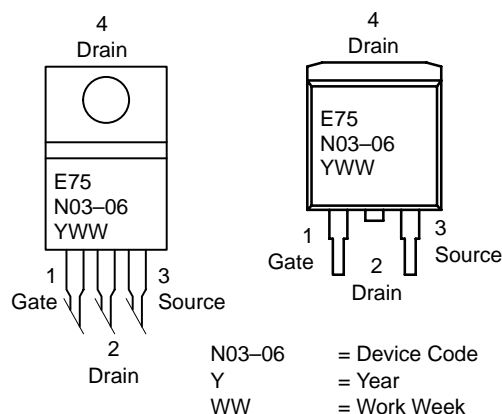
ON Semiconductor™

<http://onsemi.com>

75 AMPERES
30 VOLTS
R_{DS(on)} = 6.5 mΩ



MARKING DIAGRAMS & PIN ASSIGNMENTS



ORDERING INFORMATION

Device	Package	Shipping
NTP75N03-06	TO-220	50 Units/Rail
NTB75N03-06	D2PAK	50 Units/Rail
NTB75N03-06T4	D2PAK	800 Tape & Reel

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

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	30	Vdc
Drain-to-Gate Voltage ($R_{GS} = 10\text{ M}\Omega$)	V_{DGB}	30	Vdc
Gate-to-Source Voltage – Continuous	V_{GS}	± 20	Vdc
Non-repetitive ($t_p \leq 10\text{ ms}$)	V_{GS}	± 24	Vdc
Drain Current – Continuous @ $T_A = 25^\circ\text{C}$ – Continuous @ $T_A = 100^\circ\text{C}$ – Single Pulse ($t_p \leq 10\ \mu\text{s}$)	I_D I_D I_{DM}	75 59 225	Adc Adc Apk
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C Total Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note 1.)	P_D	150 1.0 2.5	W W/ $^\circ\text{C}$ W
Operating and Storage Temperature Range	T_J and T_{stg}	-55 to 150	$^\circ\text{C}$
Single Pulse Drain-to-Source Avalanche Energy – Starting $T_J = 25^\circ\text{C}$ ($V_{DD} = 38\text{ Vdc}$, $V_{GS} = 10\text{ Vdc}$, $L = 1\text{ mH}$, $I_L(\text{pk}) = 55\text{ A}$, $V_{DS} = 40\text{ Vdc}$)	EAS	1500	mJ
Thermal Resistance – Junction-to-Case – Junction-to-Ambient – Junction-to-Ambient (Note 1.)	$R_{\theta JC}$ $R_{\theta JA}$ $R_{\theta JA}$	1.0 62.5 50	$^\circ\text{C/W}$
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	$^\circ\text{C}$

1. When surface mounted to an FR4 board using the minimum recommended pad size.

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ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ.	Max	Unit
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OFF CHARACTERISTICS

Drain-Source Breakdown Voltage (Note 2.) (V _{GS} = 0 Vdc, I _D = 250 μAdc) Temperature Coefficient (Negative)	V _{(BR)DSS}	30	– –57	– –	Vdc mV°C
Zero Gate Voltage Drain Current (V _{DS} = 30 Vdc, V _{GS} = 0 Vdc) (V _{DS} = 30 Vdc, V _{GS} = 0 Vdc, T _J = 150°C)	I _{DSS}	– –	– –	1.0 10	μAdc
Gate-Body Leakage Current (V _{GS} = ±20 Vdc, V _{DS} = 0 Vdc)	I _{GSS}	–	–	±100	nAdc

ON CHARACTERISTICS (Note 2.)

Gate Threshold Voltage (Note 2.) (V _{DS} = V _{GS} , I _D = 250 μAdc) Threshold Temperature Coefficient (Negative)	V _{GS(th)}	1.0 –	1.6 –6	2.0 –	Vdc mV°C
Static Drain-to-Source On-Resistance (Note 2.) (V _{GS} = 10 Vdc, I _D = 37.5 Adc)	R _{DS(on)}	–	5.3	6.5	mΩ
Static Drain-to-Source On Resistance (Note 2.) (V _{GS} = 10 Vdc, I _D = 75 Adc) (V _{GS} = 10 Vdc, I _D = 37.5 Adc, T _J = 125°C)	V _{DS(on)}	– –	0.53 0.35	0.68 0.50	Vdc
Forward Transconductance (Notes 2. & 4.) (V _{DS} = 3 Vdc, I _D = 20 Adc)	g _{FS}	–	58	–	Mhos

DYNAMIC CHARACTERISTICS (Note 4.)

Input Capacitance	(V _{DS} = 25 Vdc, V _{GS} = 0, f = 1.0 MHz)	C _{iss}	–	4398	5635	pF
Output Capacitance		C _{oss}	–	1160	1894	
Transfer Capacitance		C _{rss}	–	317	430	

SWITCHING CHARACTERISTICS (Notes 3. & 4.)

Turn-On Delay Time	(V _{GS} = 5.0 Vdc, V _{DD} = 20 Vdc, I _D = 75 Adc, R _G = 4.7 Ω) (Note 2.)	t _{d(on)}	–	31	48	ns
Rise Time		t _r	–	510	986	
Turn-Off Delay Time		t _{d(off)}	–	99	120	
Fall Time		t _f	–	203	300	
Gate Charge	(V _{GS} = 5.0 Vdc, I _D = 75 Adc, V _{DS} = 24 Vdc) (Note 2.)	Q _T	–	52	122	nC
	Q ₁	–	6.6	28		
	Q ₂	–	28	66		

SOURCE-DRAIN DIODE CHARACTERISTICS

Forward On-Voltage	(I _S = 75 Adc, V _{GS} = 0 Vdc) (I _S = 75 Adc, V _{GS} = 0 Vdc, T _J = 125°C) (Note 2.)	V _{SD}	– –	1.19 1.09	1.25 –	Vdc
Reverse Recovery Time (Note 4.)	(I _S = 75 Adc, V _{GS} = 0 Vdc di _S /dt = 100 A/μs) (Note 2.)	t _{rr}	–	37	–	ns
		t _a	–	20	–	
Reverse Recovery Stored Charge (Note 4.)		t _b	–	17	–	μC
	Q _{RR}	–	0.023	–	–	

2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
3. Switching characteristics are independent of operating junction temperatures.
4. From characterization test data.

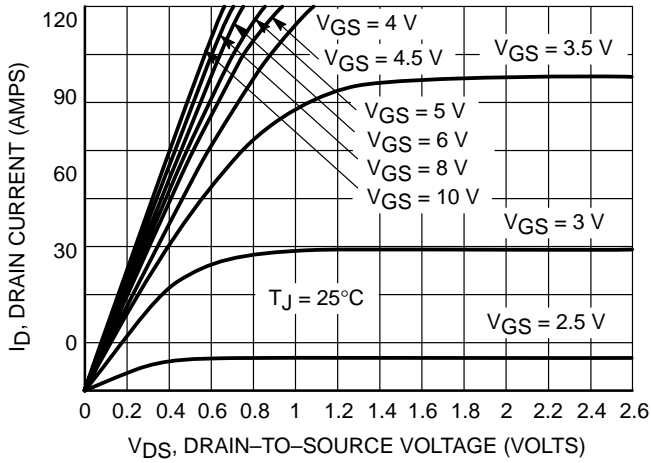


Figure 1. On-Region Characteristics

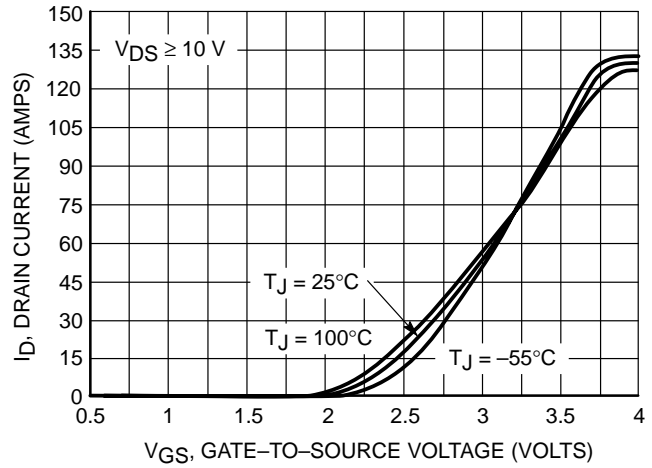


Figure 2. Transfer Characteristics

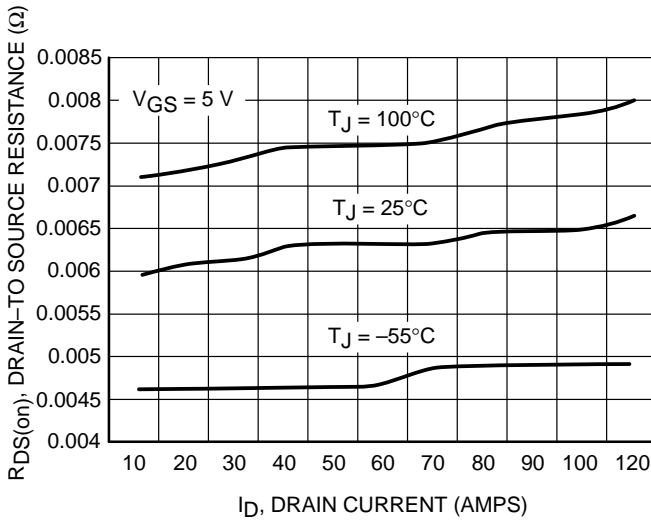


Figure 3. On-Resistance vs. Drain Current and Temperature

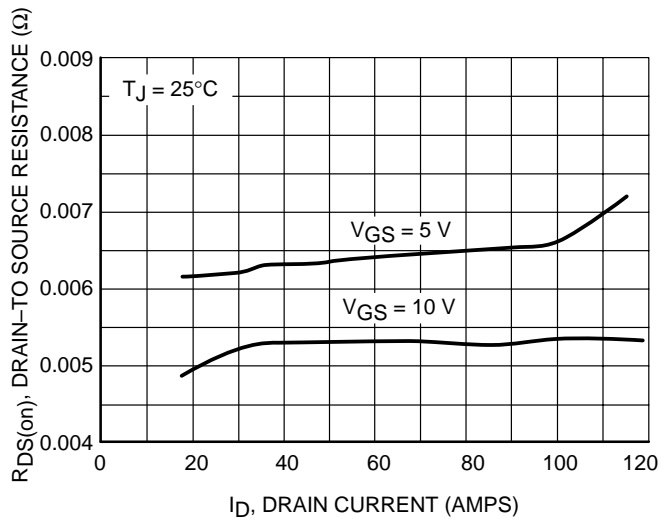


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

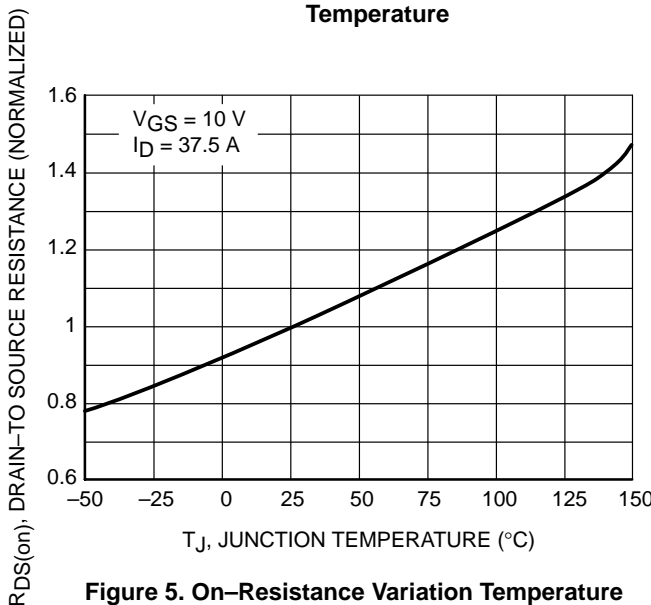


Figure 5. On-Resistance Variation Temperature

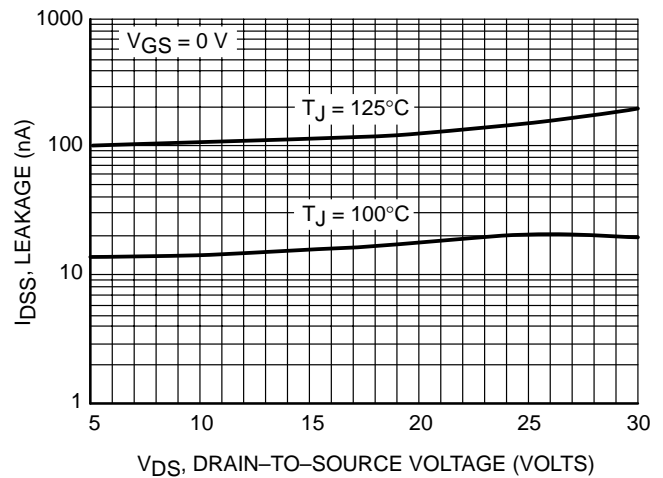


Figure 6. Drain-to-Source Leakage Current vs. Voltage

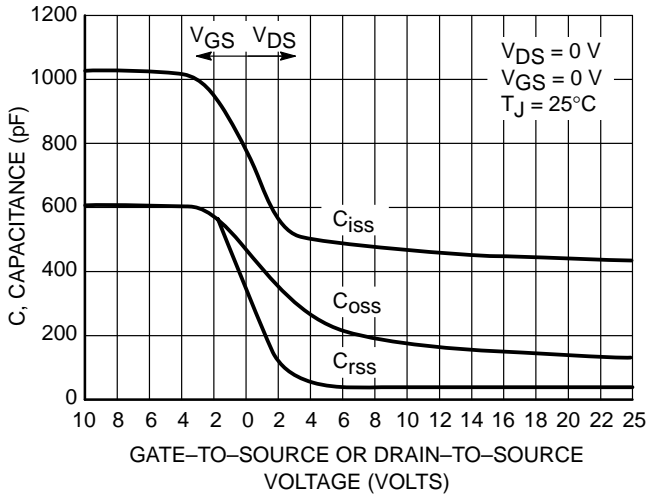


Figure 7. Capacitance Variation

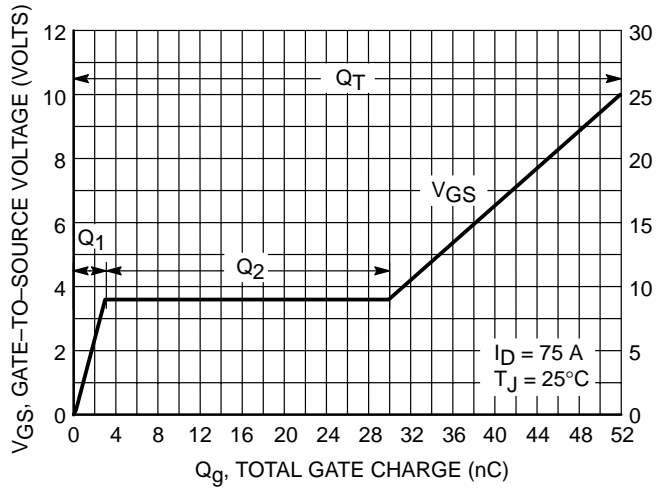


Figure 8. Gate-to-Source Voltage vs. Total Charge

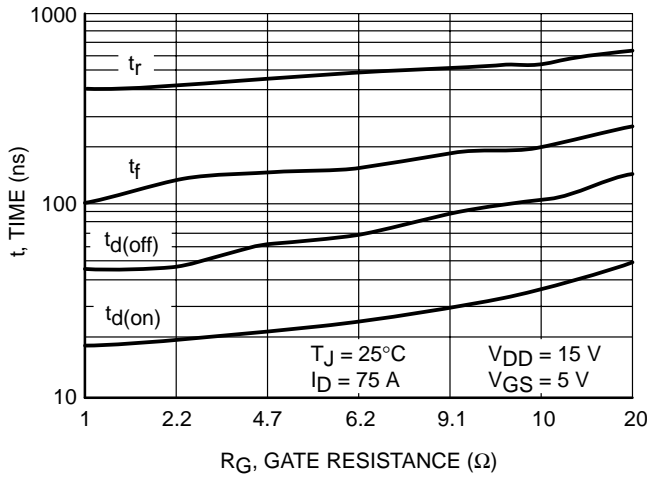


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

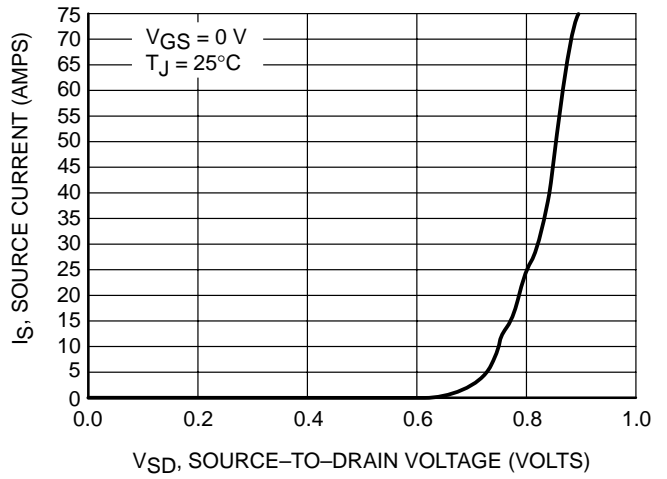


Figure 10. Diode Forward Voltage vs. Current

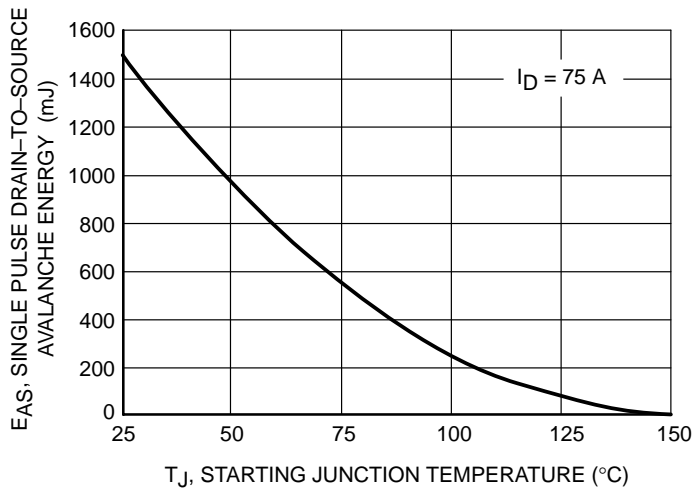
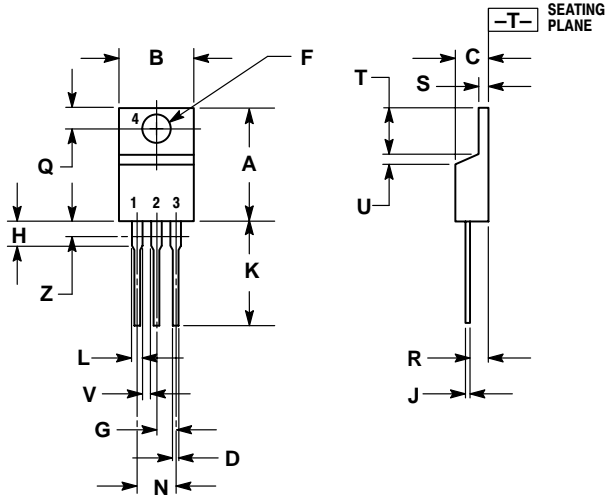


Figure 11. Maximum Avalanche Energy vs. Starting Junction Temperature

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PACKAGE DIMENSIONS

TO-220 THREE-LEAD
 TO-220AB
 CASE 221A-09
 ISSUE AA



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.035	0.64	0.88
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.018	0.025	0.46	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	---	1.15	---
Z	---	0.080	---	2.04

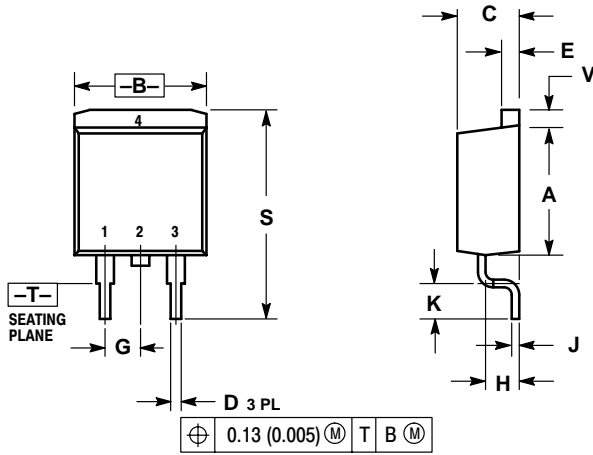
STYLE 5:

- PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

NTP75N03-06, NTB75N03-06

PACKAGE DIMENSIONS


D2PAK
CASE 418B-03
ISSUE D



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.340	0.380	8.64	9.65
B	0.380	0.405	9.65	10.29
C	0.160	0.190	4.06	4.83
D	0.020	0.035	0.51	0.89
E	0.045	0.055	1.14	1.40
G	0.100 BSC		2.54 BSC	
H	0.080	0.110	2.03	2.79
J	0.018	0.025	0.46	0.64
K	0.090	0.110	2.29	2.79
S	0.575	0.625	14.60	15.88
V	0.045	0.055	1.14	1.40

- STYLE 2:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

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