

# NTD20P06L

## ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
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### OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = -250 μA	-60	-74		V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V <sub>(BR)DSS</sub> /T <sub>J</sub>			-64		mV/°C
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = -60 V	T <sub>J</sub> = 25°C		-1.0	μA
			T <sub>J</sub> = 150°C		-10	
Gate-to-Source Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V			±100	nA

### ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = -250 μA	-1.0	-1.5	-2.0	V
Gate Threshold Temperature Coefficient	V <sub>GS(TH)</sub> /T <sub>J</sub>			3.1		mV/°C
Drain-to-Source On Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = -5.0 V, I <sub>D</sub> = -7.5 A		0.130	0.150	Ω
		V <sub>GS</sub> = -5.0 V, I <sub>D</sub> = -15 A		0.143		
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = -10 V, I <sub>D</sub> = -7.5 A		11		S
Drain-to-Source On-Voltage	V <sub>DS(on)</sub>	V <sub>GS</sub> = -5.0 V, I <sub>D</sub> = -7.5 A	T <sub>J</sub> = 25°C		-1.2	V
			T <sub>J</sub> = 150°C		-1.9	

### CHARGES AND CAPACITANCES

Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> = 0 V, f = 1 MHz, V <sub>DS</sub> = -25 V		740	1190	pF
Output Capacitance	C <sub>OSS</sub>			207	300	
Reverse Transfer Capacitance	C <sub>RSS</sub>			66	120	
Total Gate Charge	Q <sub>G(TOT)</sub>	V <sub>GS</sub> = -5.0 V, V <sub>DS</sub> = -48 V, I <sub>D</sub> = -18 A		15	26	nC
Gate-to-Source Charge	Q <sub>GS</sub>			4.0		
Gate-to-Drain Charge	Q <sub>GD</sub>			7.0		

### SWITCHING CHARACTERISTICS (Note 4)

Turn-On Delay Time	t <sub>d(ON)</sub>	V <sub>GS</sub> = -5.0 V, V <sub>DD</sub> = -30 V, I <sub>D</sub> = -15 A, R <sub>G</sub> = 9.1 Ω		11	20	ns
Rise Time	t <sub>r</sub>			90	180	
Turn-Off Delay Time	t <sub>d(OFF)</sub>			28	50	
Fall Time	t <sub>f</sub>			70	135	

### DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = -15 A	T <sub>J</sub> = 25°C		1.5	2.5	V
			T <sub>J</sub> = 150°C		1.3		
Reverse Recovery Time	t <sub>RR</sub>	V <sub>GS</sub> = 0 V, dI <sub>S</sub> /d <sub>t</sub> = 100 A/μs, I <sub>S</sub> = -12 A		60		ns	
Charge Time	t <sub>a</sub>			39			
Discharge Time	t <sub>b</sub>			21			
Reverse Recovery Charge	Q <sub>RR</sub>			0.13		nC	

3. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%

4. Switching characteristics are independent of operating junction temperatures

# TYPICAL PERFORMANCE CURVES

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

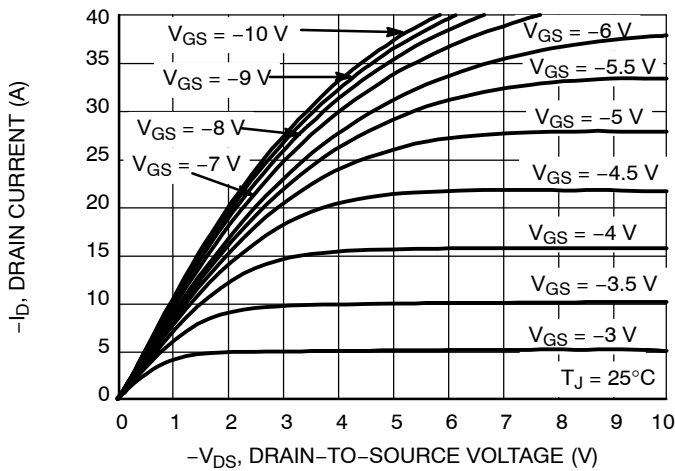


Figure 1. On-Region Characteristics

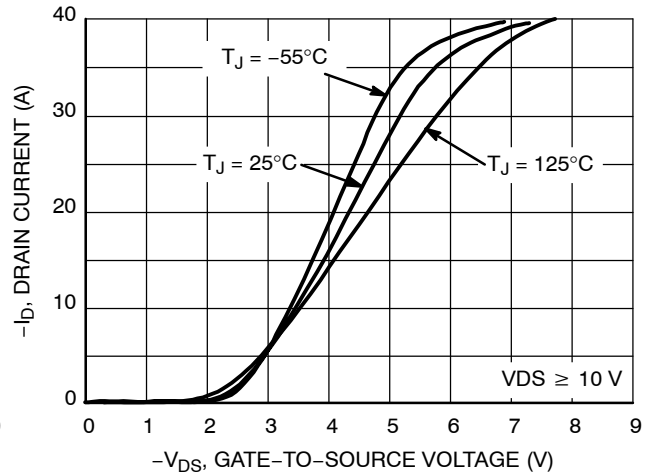


Figure 2. Transfer Characteristics

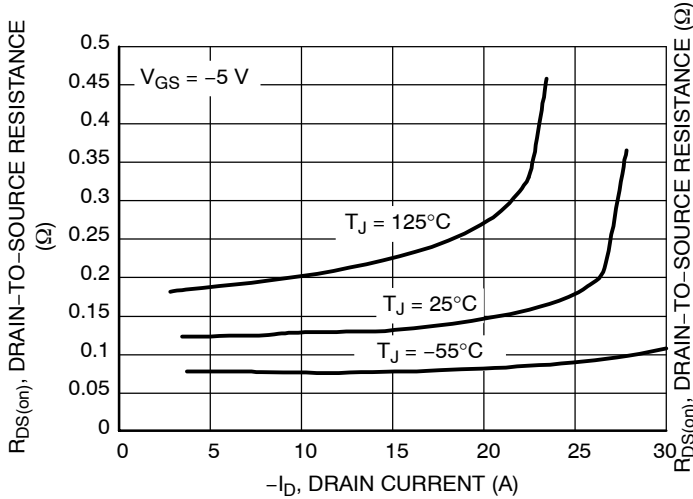


Figure 3. On-Resistance versus Drain Current and Temperature

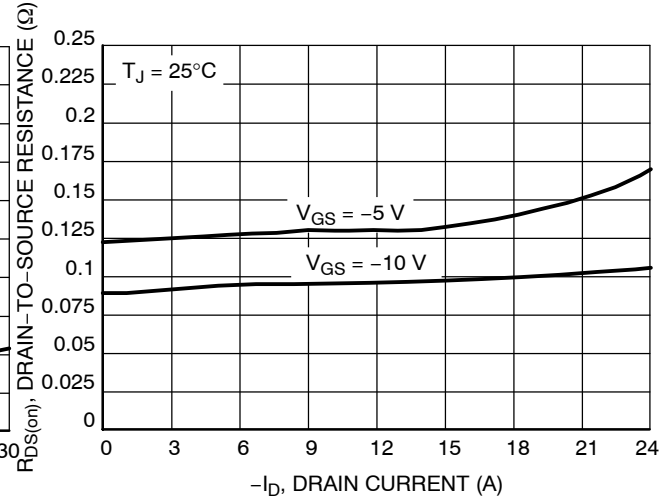


Figure 4. On-Resistance versus Drain Current and Gate Voltage

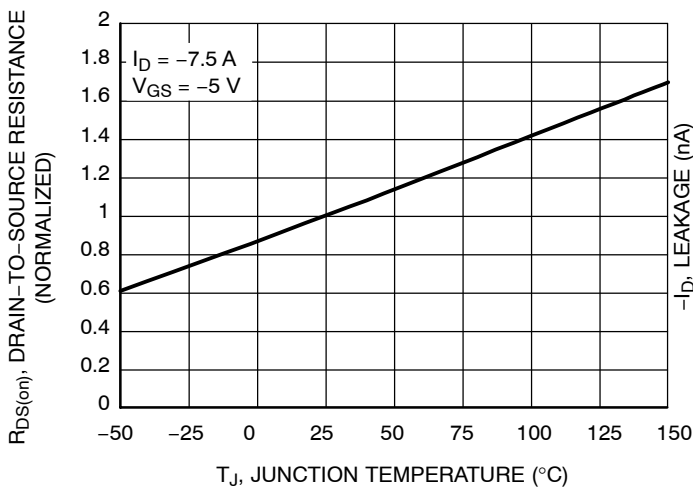


Figure 5. On-Resistance Variation with Temperature

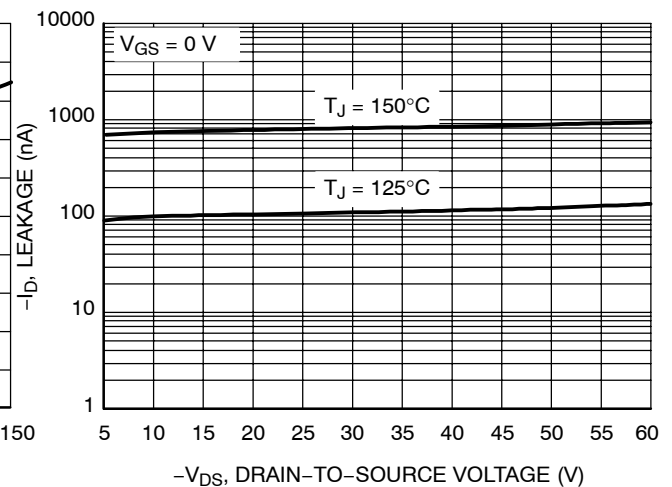
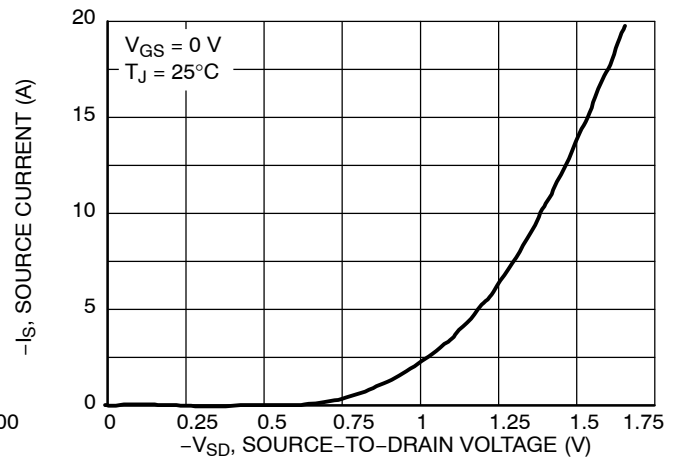
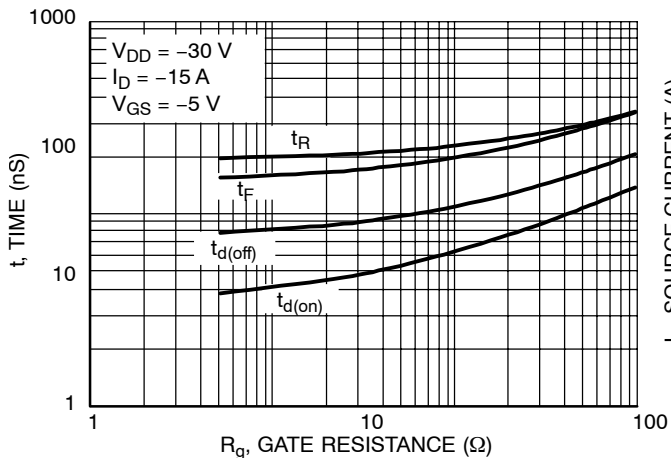
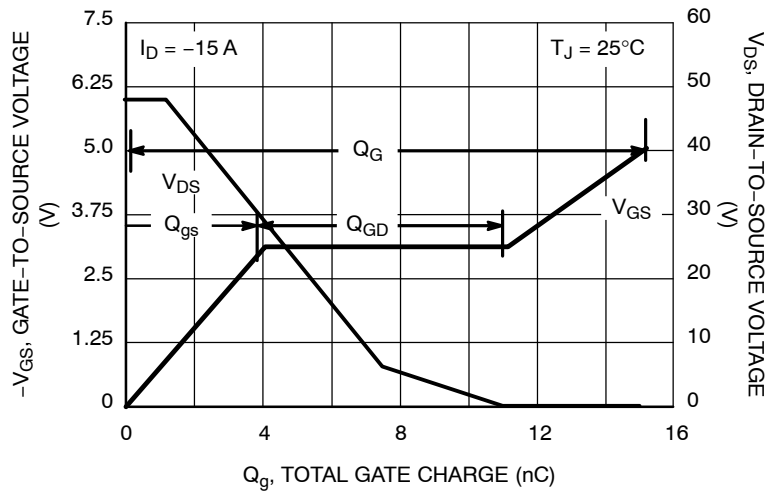
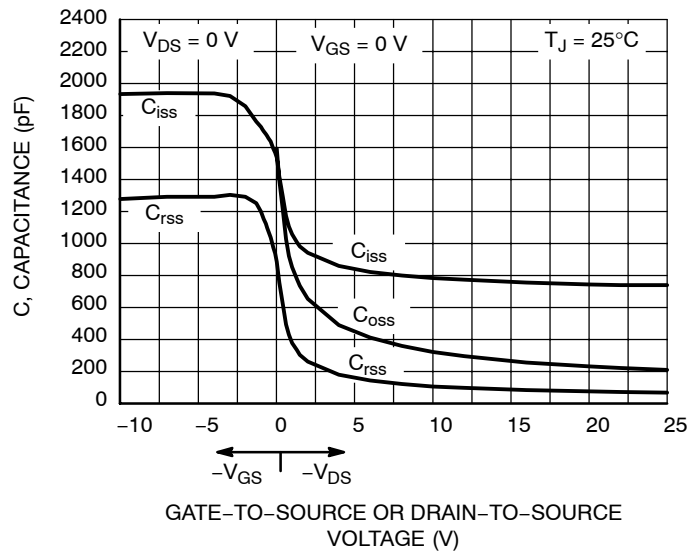
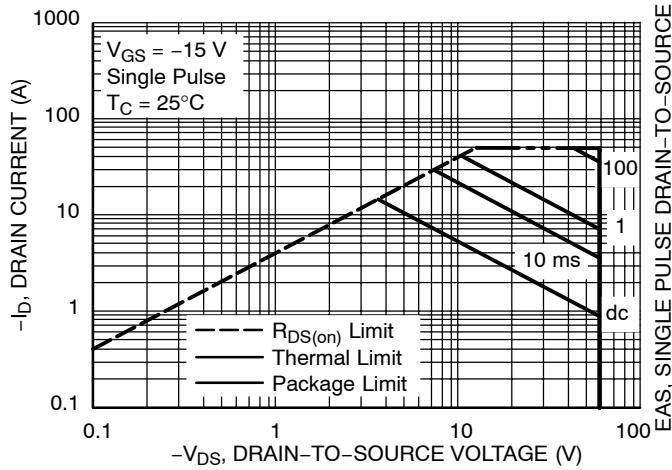


Figure 6. Drain-to-Source Leakage Current versus Voltage

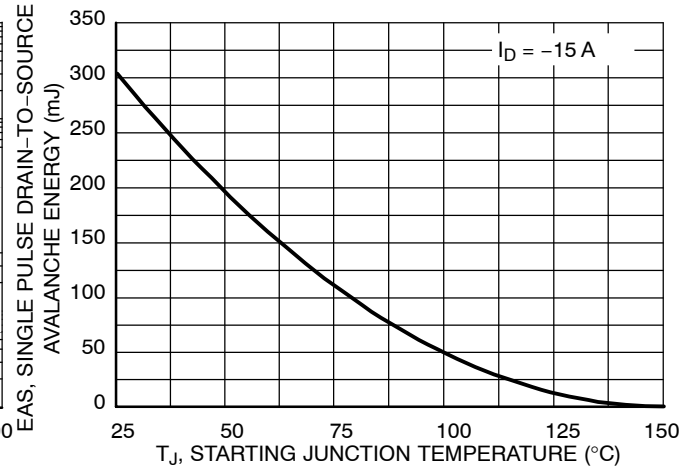
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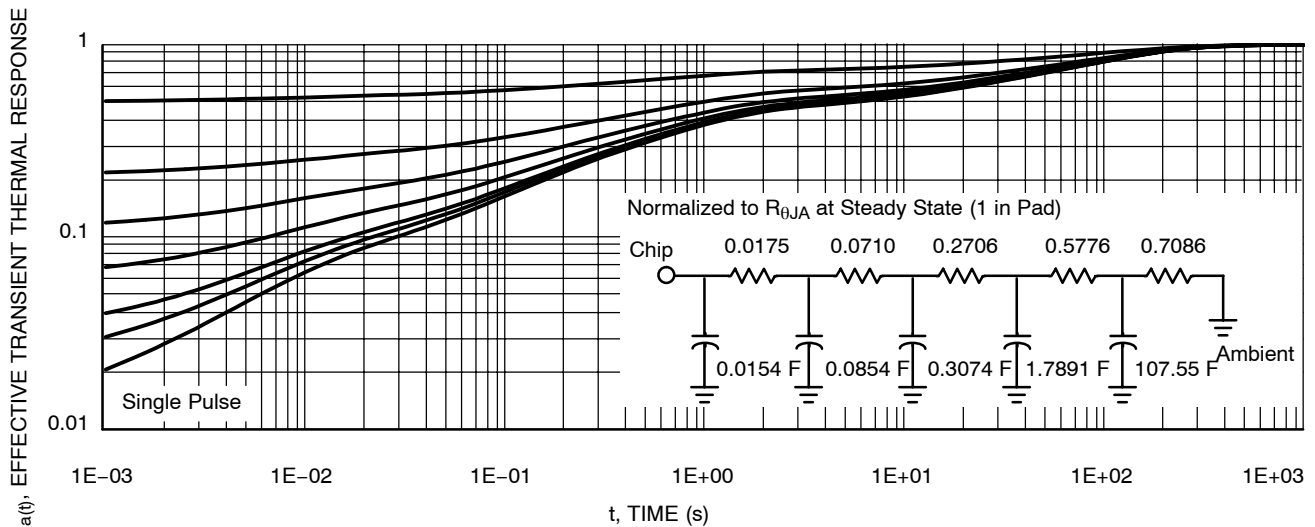
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**Figure 11. Maximum Rated Forward Biased Safe Operating Area**



**Figure 12. Maximum Avalanche Energy versus Starting Junction Temperature**



**Figure 13. Thermal Response**

## NTD20P06L

### ORDERING INFORMATION

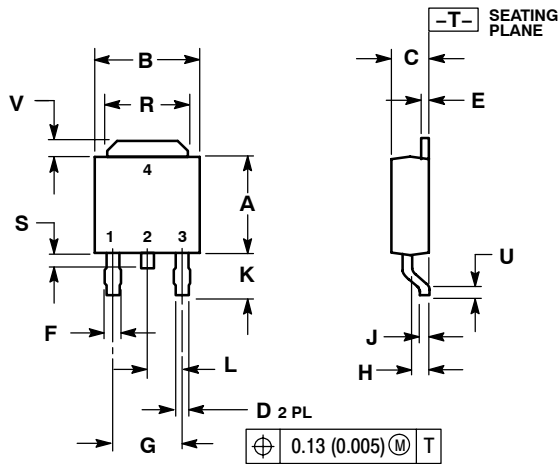
Device	Package	Shipping†
NTD20P06L-1	DPAK	75 Units / Rail
NTD20P06L		75 Units / Rail
NTD20P06LT4		2500 /Tape & Reel
NTD20P06L-1G	DPAK (Pb-Free)	75 Units / Rail
NTD20P06LG		75 Units / Rail
NTD20P06LT4G		2500 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# NTD20P06L

## PACKAGE DIMENSIONS

**DDAK-3**  
 CASE 369C-01  
 ISSUE O

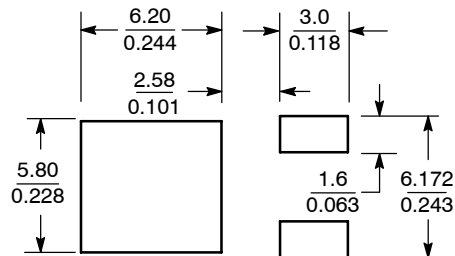


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.235	0.245	5.97	6.22
B	0.250	0.265	6.35	6.73
C	0.086	0.094	2.19	2.38
D	0.027	0.035	0.69	0.88
E	0.018	0.023	0.46	0.58
F	0.037	0.045	0.94	1.14
G	0.180 BSC		4.58 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.102	0.114	2.60	2.89
L	0.090 BSC		2.29 BSC	
R	0.180	0.215	4.57	5.45
S	0.025	0.040	0.63	1.01
U	0.020	---	0.51	---
V	0.035	0.050	0.89	1.27
Z	0.155	---	3.93	---

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

## SOLDERING FOOTPRINT\*



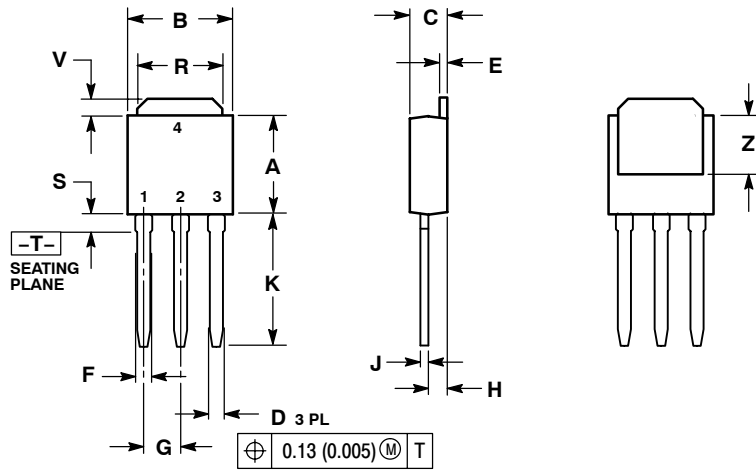
SCALE 3:1  $\left( \frac{\text{mm}}{\text{inches}} \right)$

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

# NTD20P06L

## PACKAGE DIMENSIONS

DPAK-3  
CASE 369D-01  
ISSUE B




### NOTES:

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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.235	0.245	5.97	6.35
B	0.250	0.265	6.35	6.73
C	0.086	0.094	2.19	2.38
D	0.027	0.035	0.69	0.88
E	0.018	0.023	0.46	0.58
F	0.037	0.045	0.94	1.14
G	0.090 BSC		2.29 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.350	0.380	8.89	9.65
R	0.180	0.215	4.45	5.45
S	0.025	0.040	0.63	1.01
V	0.035	0.050	0.89	1.27
Z	0.155	---	3.93	---

### STYLE 2:

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

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