

NTP5863N

N-Channel Power MOSFET

60 V, 97 A, 7.8 mΩ

Features

- Low $R_{DS(on)}$
- High Current Capability
- 100% Avalanche Tested
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant

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

Parameter			Symbol	Value	Unit
Drain-to-Source Voltage			V _{DSS}	60	V
Gate-to-Source Voltage – Continuous			V _{GS}	± 20	V
Gate-to-Source Voltage – Nonrepetitive (T _P < 10 μs)			V _{GS}	30	V
Continuous Drain Current	Steady State	T _C = 25°C	I _D	97	A
		T _C = 100°C		68	
Power Dissipation	Steady State	T _C = 25°C	P _D	150	W
Pulsed Drain Current	t _p = 10 μs		I _{DM}	383	A
Operating and Storage Temperature Range			T _J , T _{stg}	–55 to +175	°C
Source Current (Body Diode)			I _S	97	A
Single Pulse Drain-to-Source Avalanche Energy (L = 0.1 mH, I _{L(pk)} = 56 A)			E _{AS}	157	mJ
Peak Diode Recovery (dV/dt)			dV/dt	4.1	V/ns
Lead Temperature for Soldering Purposes (1/8" from Case for 10 Seconds)			T _L	260	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction-to-Case (Drain) Steady State	$R_{\theta JC}$	1.0	$^\circ\text{C/W}$
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	36	

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

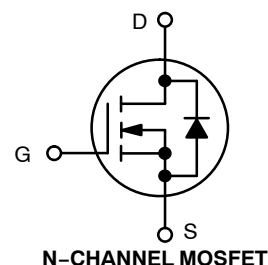
1. Surface mounted on FR4 board using 1 sq in pad size, (Cu Area 1.127 sq in [2 oz] including traces).



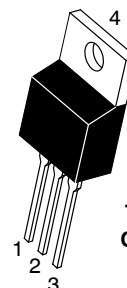
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$V_{(BR)DS}$	$R_{DS(on)}$ MAX	I_D MAX
60 V	7.8 mΩ @ 10 V	97 A

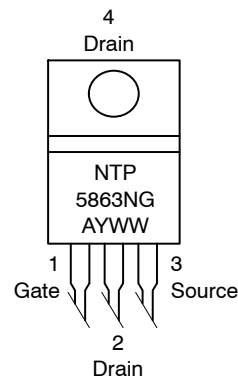


N-CHANNEL MOSFET



TO-220AB
CASE 221A
STYLE 5

MARKING DIAGRAMS & PIN ASSIGNMENTS



G = Pb-Free Device
A = Assembly Location
Y = Year
WW = Work Week

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

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ELECTRICAL CHARACTERISTICS (T_J = 25°C Unless otherwise specified)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	V _{DS} = 0 V, I _D = 250 μA	60			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} /T _J	I _D = 250 μA, ref to 25°C		47		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V V _{DS} = 60 V	T _J = 25°C		1.0	μA
			T _J = 125°C		50	
Gate-Body Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V			±100	nA

ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D = 250 μA	2.0		4.0	V
Negative Threshold Temperature Coefficient	V _{GS(th)} /T _J			9.1		mV/°C
Drain-to-Source On-Resistance	R _{DS(on)}	V _{GS} = 10 V, I _D = 20 A		6.5	7.8	mΩ
Forward Transconductance	g _{FS}	V _{DS} = 15 V, I _D = 30 A		12		S

CHARGES, CAPACITANCES & GATE RESISTANCE

Input Capacitance	C _{iss}	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz		3200		pF
Output Capacitance	C _{oss}			350		
Transfer Capacitance	C _{rss}			230		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 10 V, V _{DS} = 48 V, I _D = 48 A		55		nC
Threshold Gate Charge	Q _{G(TH)}			3.4		
Gate-to-Source Charge	Q _{GS}			14.5		
Gate-to-Drain Charge	Q _{GD}			19		
Gate Resistance	R _G			0.4		Ω

SWITCHING CHARACTERISTICS, V_{GS} = 10 V (Note 3)

Turn-On Delay Time	t _{d(on)}	V _{GS} = 10 V, V _{DD} = 48 V, I _D = 48 A, R _G = 2.5 Ω		10		ns
Rise Time	t _r			34		
Turn-Off Delay Time	t _{d(off)}			25		
Fall Time	t _f			9.0		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V _{SD}	V _{GS} = 0 V I _S = 48 A	T _J = 25°C		0.96	1.5	V _{dc}
			T _J = 150°C		0.85		
Reverse Recovery Time	t _{rr}	V _{GS} = 0 V _{dc} , I _S = 48 A _{dc} , dI _S /dt = 100 A/μs		32			ns
Charge Time	t _a			20			
Discharge Time	t _b			12			
Reverse Recovery Stored Charge	Q _{RR}			28			nC

2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

3. Switching characteristics are independent of operating junction temperatures.

TYPICAL PERFORMANCE CHARACTERISTICS

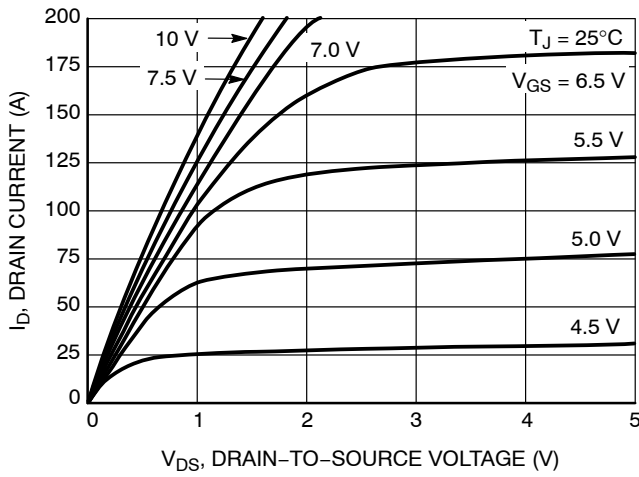


Figure 1. On-Region Characteristics

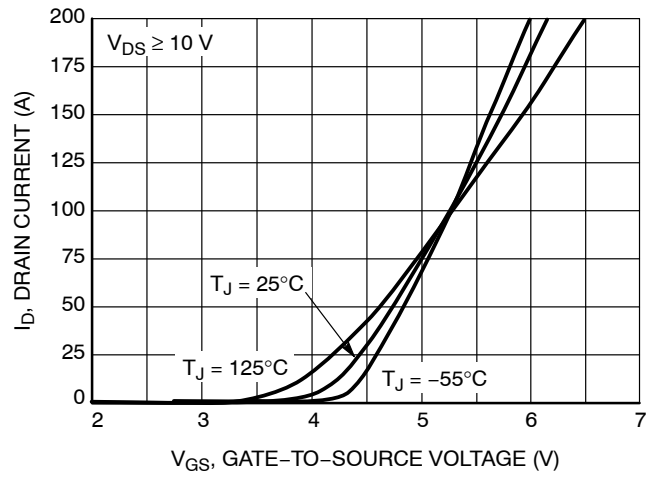


Figure 2. Transfer Characteristics

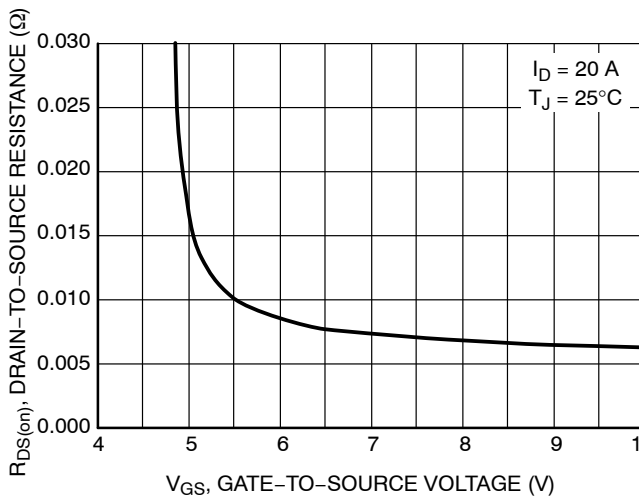


Figure 3. On-Resistance vs. Gate Voltage

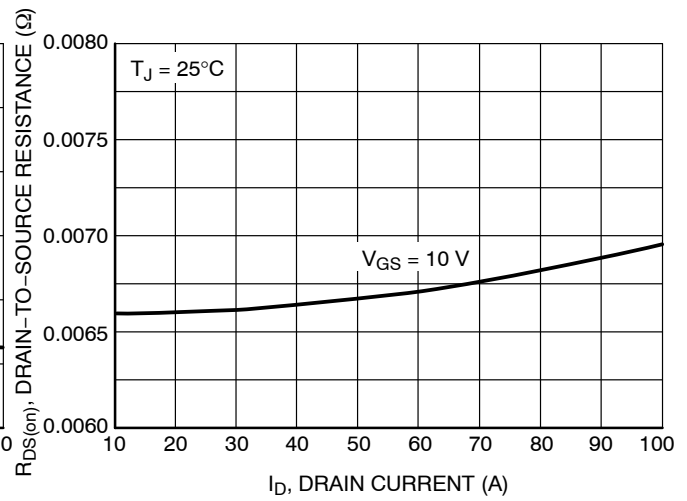


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

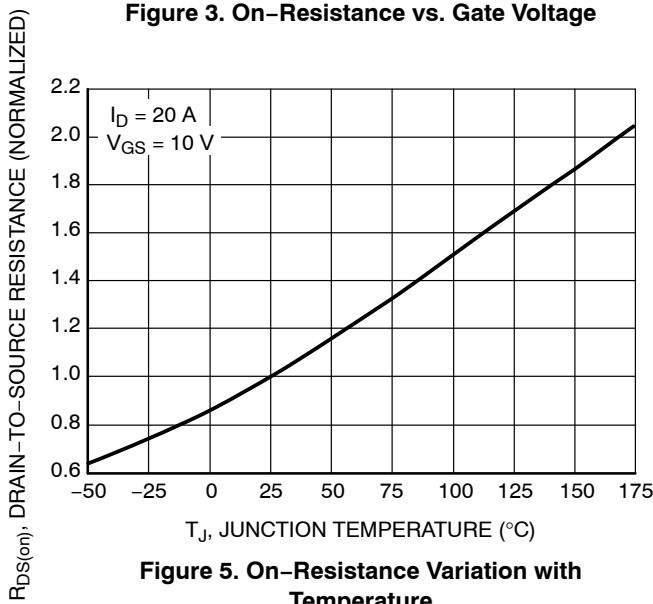


Figure 5. On-Resistance Variation with Temperature

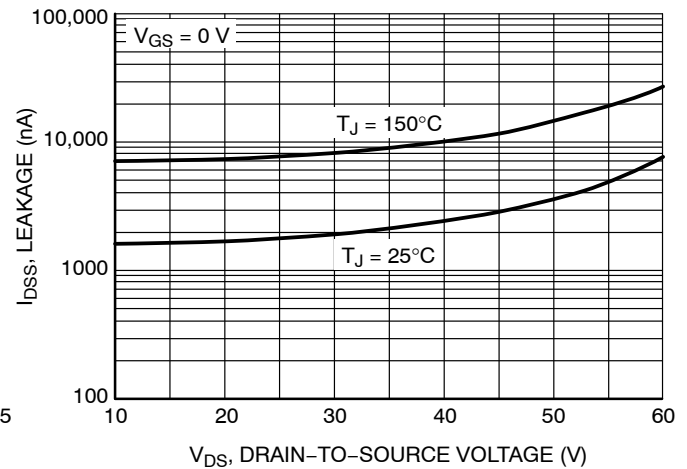


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL PERFORMANCE CHARACTERISTICS

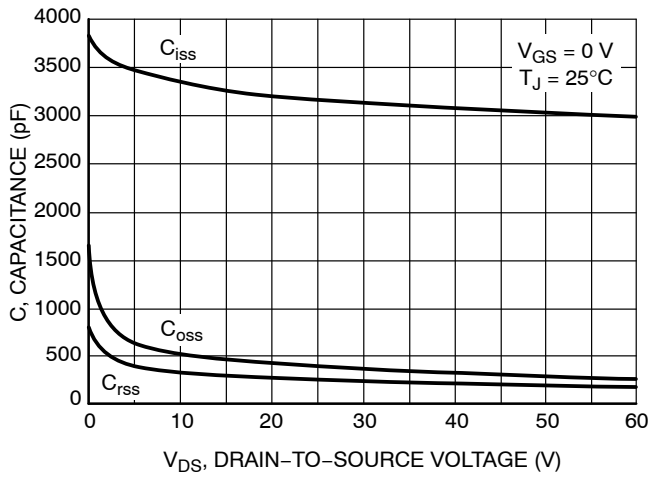


Figure 7. Capacitance Variation

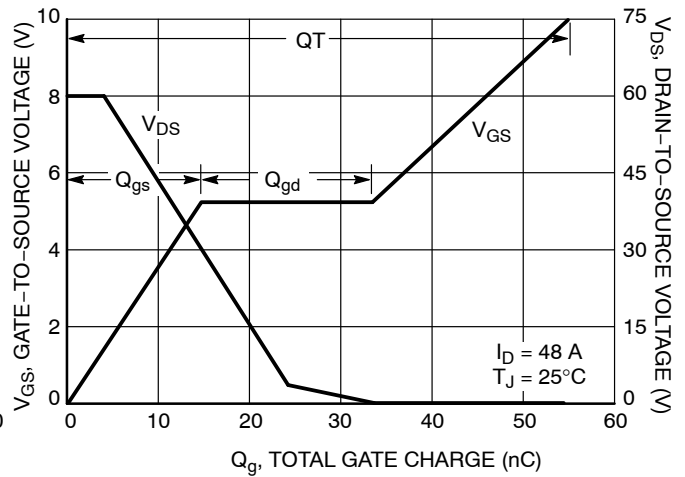


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

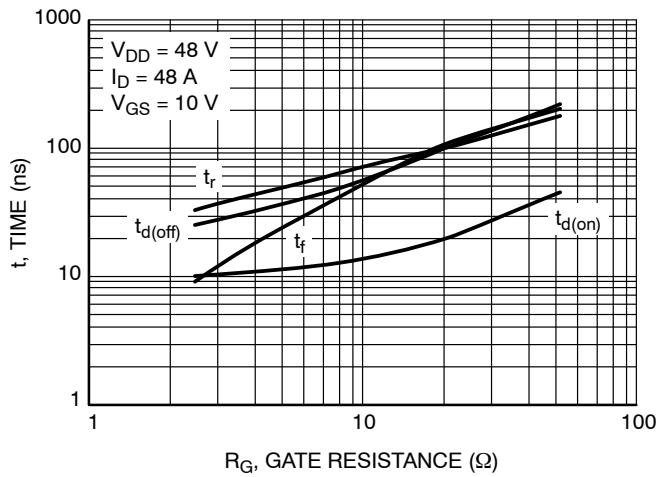


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

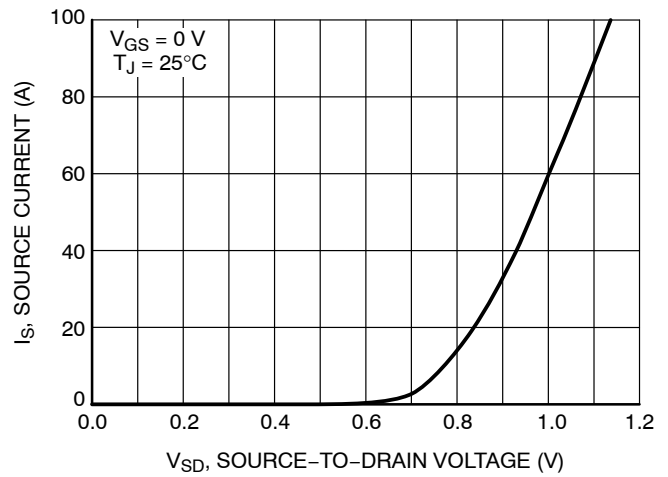


Figure 10. Diode Forward Voltage vs. Current

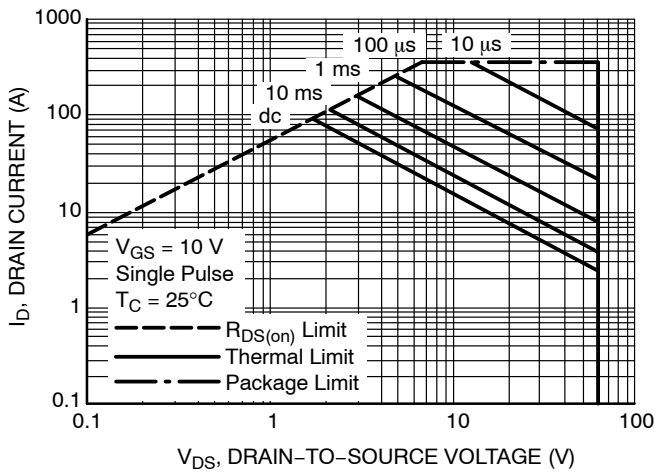


Figure 11. Maximum Rated Forward Biased Safe Operating Area

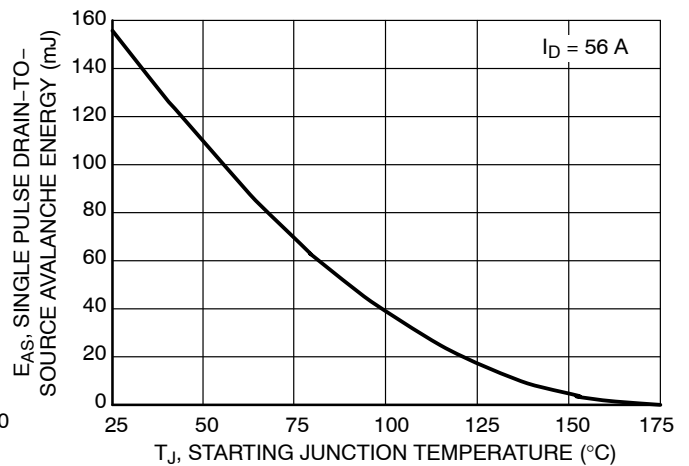


Figure 12. Maximum Avalanche Energy vs. Starting Junction Temperature

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TYPICAL PERFORMANCE CHARACTERISTICS

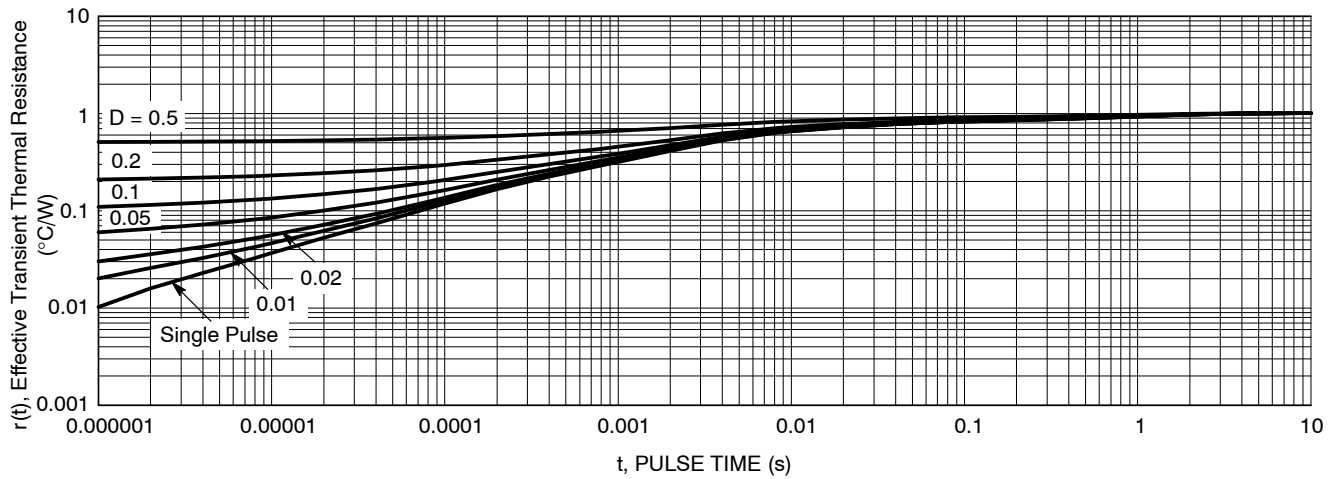


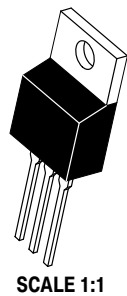
Figure 13. Thermal Response

ORDERING INFORMATION

Device	Package	Shipping [†]
NTP5863NG	TO-220AB (Pb-Free)	50 Units / Rail

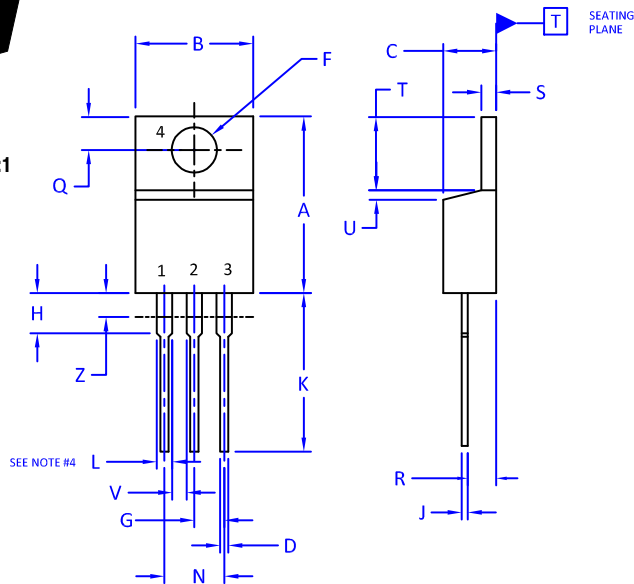
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



TO-220 CASE 221A ISSUE AK

DATE 13 JAN 2022



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 2009.
2. CONTROLLING DIMENSION: INCHES
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.
4. MAX WIDTH FOR F102 DEVICE = 1.35MM

DIM	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	0.570	0.620	14.48	15.75
B	0.380	0.415	9.66	10.53
C	0.160	0.190	4.07	4.83
D	0.025	0.038	0.64	0.96
F	0.142	0.161	3.60	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.161	2.80	4.10
J	0.014	0.024	0.36	0.61
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	1.41
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 1:
PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 2:
PIN 1. BASE
2. EMITTER
3. COLLECTOR
4. EMITTER

STYLE 3:
PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

STYLE 4:
PIN 1. MAIN TERMINAL 1
2. MAIN TERMINAL 2
3. GATE
4. MAIN TERMINAL 2

STYLE 5:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

STYLE 6:
PIN 1. ANODE
2. CATHODE
3. ANODE
4. CATHODE

STYLE 7:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. ANODE

STYLE 8:
PIN 1. CATHODE
2. ANODE
3. EXTERNAL TRIP/DELAY
4. ANODE

STYLE 9:
PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 10:
PIN 1. GATE
2. SOURCE
3. DRAIN
4. SOURCE

STYLE 11:
PIN 1. DRAIN
2. SOURCE
3. GATE
4. SOURCE

STYLE 12:
PIN 1. MAIN TERMINAL 1
2. MAIN TERMINAL 2
3. GATE
4. NOT CONNECTED

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DESCRIPTION: TO-220

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Europe, Middle East and Africa Technical Support:

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