

# BTA30H-600CW3G, BTA30H-800CW3G



**ON Semiconductor®**

<http://onsemi.com>

## Triacs Silicon Bidirectional Thyristors

Designed for high performance full-wave ac control applications where high noise immunity and high commutating di/dt are required.

### Features

- Blocking Voltage to 800 V
- On-State Current Rating of 30 Amperes RMS at 95°C
- Uniform Gate Trigger Currents in Three Quadrants
- High Immunity to dV/dt – 500 V/μs minimum at 150°C
- Minimizes Snubber Networks for Protection
- Industry Standard TO-220AB Package – Internally Isolated
- High Commutating di/dt – 4.0 A/ms minimum at 150°C
- Internally Isolated (2500 V<sub>RMS</sub>)
- These are Pb-Free Devices

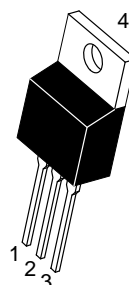
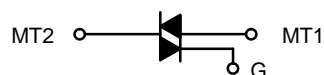
### MAXIMUM RATINGS (T<sub>J</sub> = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage (Note 1) (T <sub>J</sub> = -40 to 150°C, Sine Wave, 50 to 60 Hz, Gate Open)	V <sub>DRM</sub> , V <sub>RRM</sub>	600 800	V
On-State RMS Current (Full Cycle Sine Wave, 60 Hz, T <sub>C</sub> = 95°C)	I <sub>T(RMS)</sub>	30	A
Peak Non-Repetitive Surge Current (One Full Cycle Sine Wave, 60 Hz, T <sub>C</sub> = 25°C)	I <sub>TSM</sub>	400	A
Circuit Fusing Consideration (t = 8.3 ms)	I <sup>2</sup> t	667	A <sup>2</sup> sec
Non-Repetitive Surge Peak Off-State Voltage (T <sub>J</sub> = 25°C, t = 8.3 ms)	V <sub>DSM</sub> / V <sub>RRM</sub>	V <sub>DRM</sub> /V <sub>RRM</sub> +100	V
Peak Gate Current (T <sub>J</sub> = 150°C, t ≤ 20 μs)	I <sub>GM</sub>	4.0	A
Average Gate Power (T <sub>J</sub> = 150°C)	P <sub>G(AV)</sub>	0.5	W
Operating Junction Temperature Range	T <sub>J</sub>	-40 to +150	°C
Storage Temperature Range	T <sub>stg</sub>	-40 to +150	°C
RMS Isolation Voltage (t = 300 ms, R.H. ≤ 30%, T <sub>A</sub> = 25°C)	V <sub>iso</sub>	2500	V

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. V<sub>DRM</sub> and V<sub>RRM</sub> for all types can be applied on a continuous basis. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.

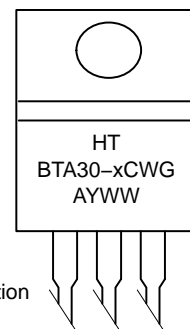
## TRIACS 30 AMPERES RMS 600 thru 800 VOLTS



TO-220AB  
CASE 221A  
STYLE 12

- x = 6 or 8
- A = Assembly Location
- Y = Year
- WW = Work Week
- G = Pb-Free Package

### MARKING DIAGRAM



### PIN ASSIGNMENT

1	Main Terminal 1
2	Main Terminal 2
3	Gate
4	No Connection

### ORDERING INFORMATION

Device	Package	Shipping
BTA30H-600CW3G	TO-220AB (Pb-Free)	50 Units / Rail
BTA30H-800CW3G	TO-220AB (Pb-Free)	50 Units / Rail

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

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## THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case (AC)	$R_{\theta JC}$	1.8	$^{\circ}\text{C}/\text{W}$
Junction-to-Ambient	$R_{\theta JA}$	60	
Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 seconds	$T_L$	260	$^{\circ}\text{C}$

## ELECTRICAL CHARACTERISTICS ( $T_J = 25^{\circ}\text{C}$ unless otherwise noted; Electricals apply in both directions)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Peak Repetitive Blocking Current ( $V_D = \text{Rated } V_{DRM}, V_{RRM}; \text{ Gate Open}$ )	$I_{DRM}, I_{RRM}$	-	-	0.005	mA
		-	-	15	

## ON CHARACTERISTICS

Peak On-State Voltage (Notes 2 and 3) ( $I_{TM} = \pm 42 \text{ A Peak}$ )	$V_{TM}$	-	-	1.55	V
Threshold Voltage, $T_J = 150^{\circ}\text{C}$ (Note 2)	$V_{to}$	-	-	0.85	V
Dynamic Resistance, $T_J = 150^{\circ}\text{C}$ (Note 2)	$R_d$	-	-	16	$\text{m}\Omega$
Gate Trigger Current (Continuous dc) ( $V_D = 12 \text{ V}, R_L = 30 \Omega$ )	$I_{GT}$				mA
MT2(+), G(+)		8.0	-	35	
MT2(+), G(-)		8.0	-	35	
MT2(-), G(-)		8.0	-	35	
Holding Current ( $V_D = 12 \text{ V}, \text{ Gate Open}, \text{ Initiating Current} = \pm 100 \text{ mA}$ )	$I_H$	-	-	50	mA
Latching Current ( $V_D = 12 \text{ V}, I_G = 42 \text{ mA}$ )	$I_L$				mA
MT2(+), G(+)		-	-	75	
MT2(+), G(-)		-	-	75	
MT2(-), G(-)		-	-	75	
Gate Trigger Voltage ( $V_D = 12 \text{ V}, R_L = 30 \Omega$ )	$V_{GT}$				V
MT2(+), G(+)		-	-	1.3	
MT2(+), G(-)		-	-	1.3	
MT2(-), G(-)		-	-	1.3	
Gate Non-Trigger Voltage ( $T_J = 150^{\circ}\text{C}$ )	$V_{GD}$				V
MT2(+), G(+)		0.15	-	-	
MT2(+), G(-)		0.15	-	-	
MT2(-), G(-)		0.15	-	-	

## DYNAMIC CHARACTERISTICS

Rate of Change of Commutating Current, See Figure 10. (Gate Open, $T_J = 150^{\circ}\text{C}$ , No Snubber) (Note 4)	$(di/dt)_c$	4.0	-	-	A/ms
Critical Rate of Rise of On-State Current ( $T_J = 150^{\circ}\text{C}, f = 120 \text{ Hz}, I_G = 2 \times I_{GT}, tr \leq 100 \text{ ns}$ )	$di/dt$	-	-	50	A/ $\mu\text{s}$
Critical Rate of Rise of Off-State Voltage ( $V_D = 0.66 \times V_{DRM}$ , Exponential Waveform, Gate Open, $T_J = 150^{\circ}\text{C}$ )	$dV/dt$	500	-	-	V/ $\mu\text{s}$

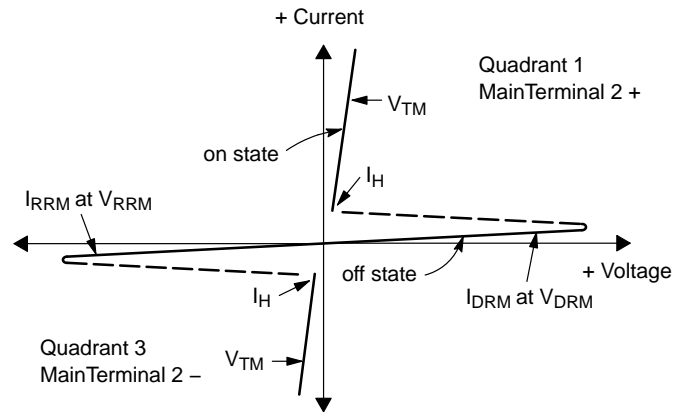
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. Indicates Pulse Test: Pulse Width  $\leq 2.0 \text{ ms}$ , Duty Cycle  $\leq 2\%$ .
3. For both polarities.
4.  $dv/dt(c) = 35 \text{ V}/\mu\text{s}$  (exponential to 200 Vpk)

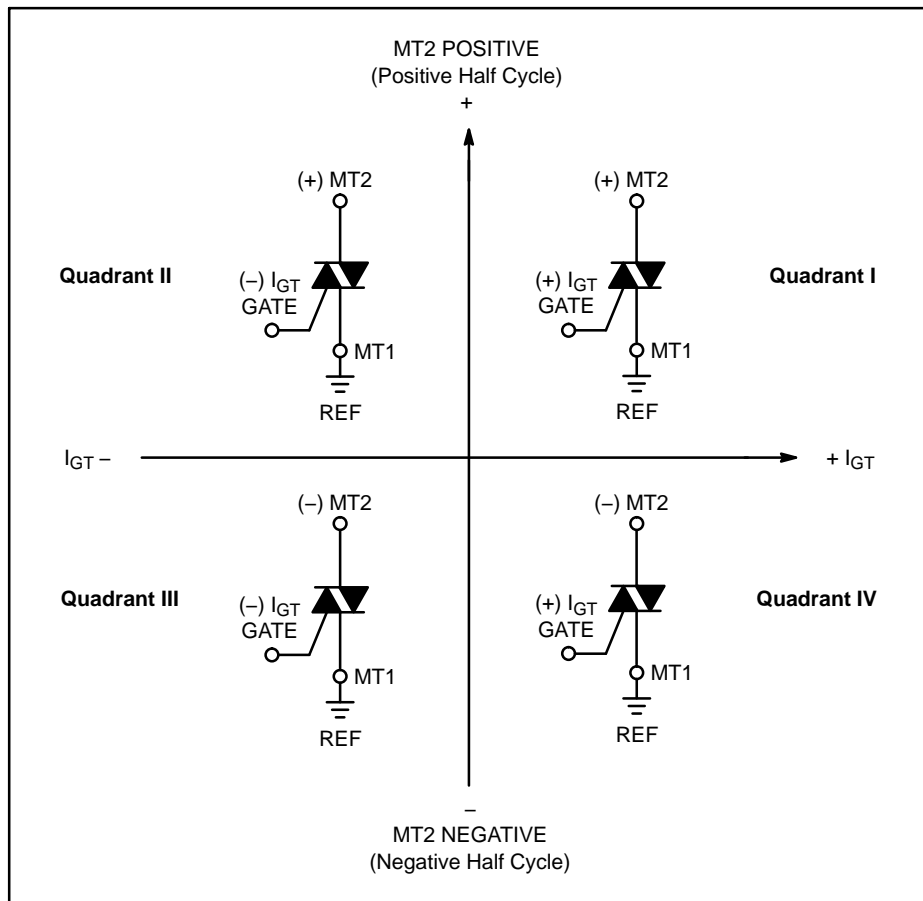
# BTA30H-600CW3G, BTA30H-800CW3G

## Voltage Current Characteristic of Triacs (Bidirectional Device)

Symbol	Parameter
$V_{DRM}$	Peak Repetitive Forward Off State Voltage
$I_{DRM}$	Peak Forward Blocking Current
$V_{RRM}$	Peak Repetitive Reverse Off State Voltage
$I_{RRM}$	Peak Reverse Blocking Current
$V_{TM}$	Maximum On State Voltage
$I_H$	Holding Current



### Quadrant Definitions for a Triac



All polarities are referenced to MT1.

With in-phase signals (using standard AC lines) quadrants I and III are used.

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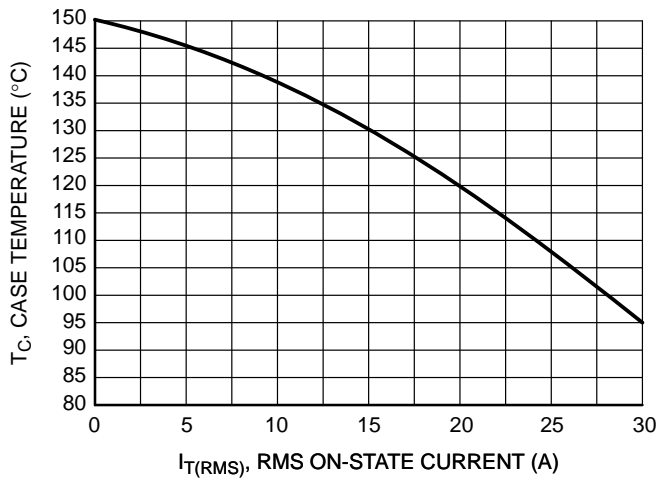


Figure 1. RMS Current Derating

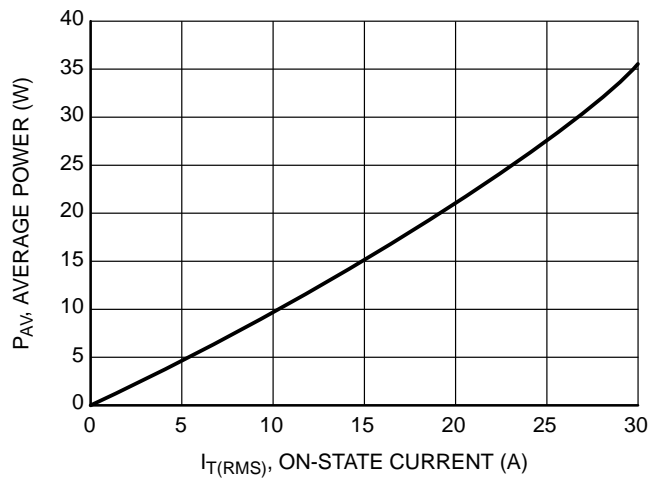


Figure 2. On-State Power Dissipation

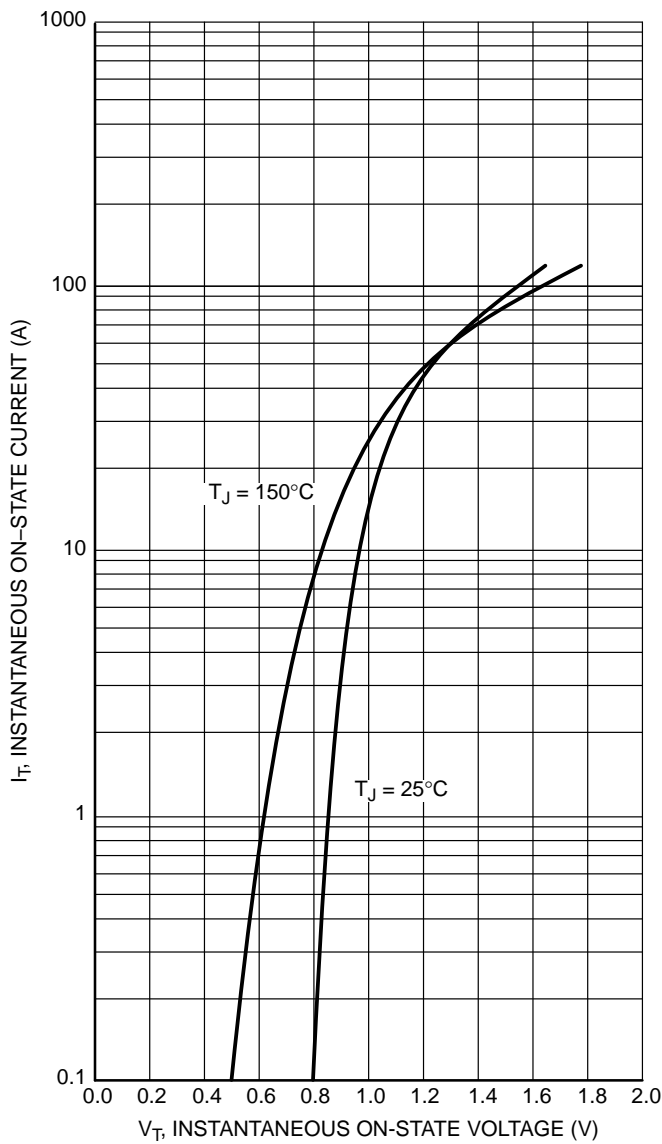


Figure 3. On-State Characteristics

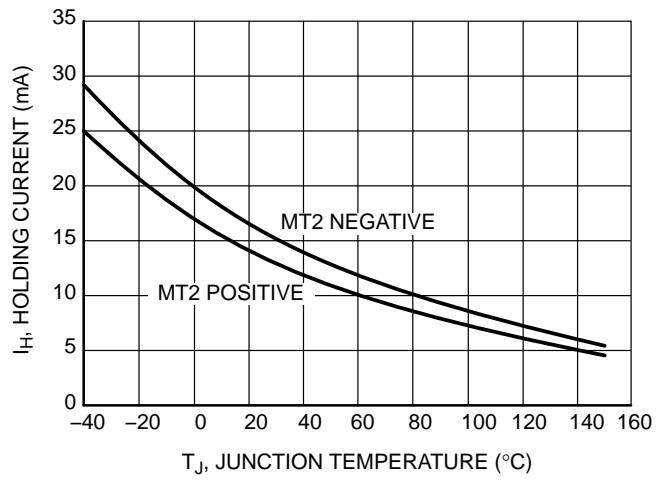


Figure 4. Hold Current Variation

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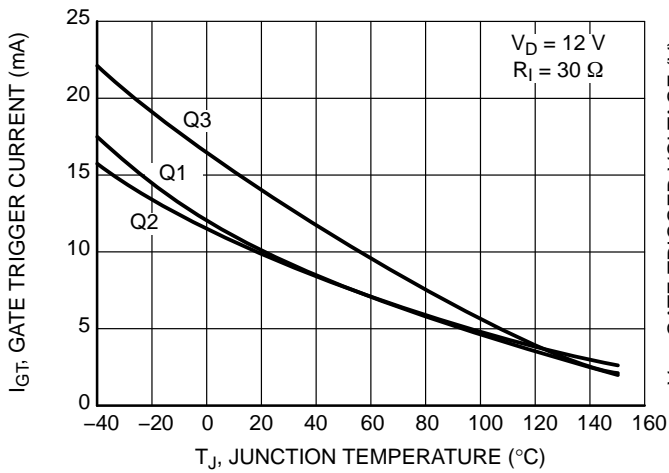


Figure 5. Gate Trigger Current Variation

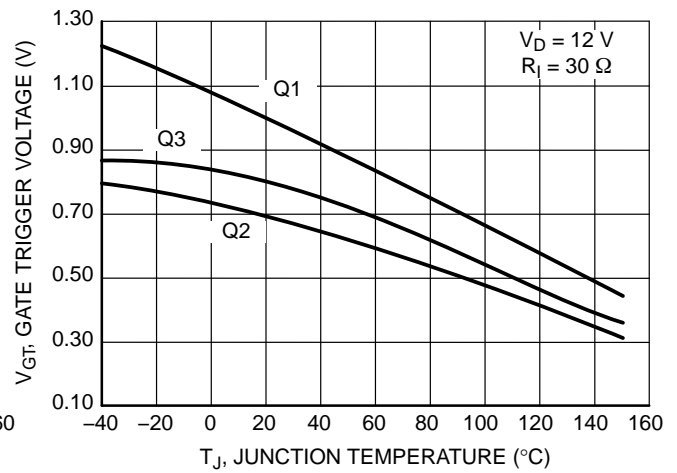


Figure 6. Gate Trigger Voltage Variation

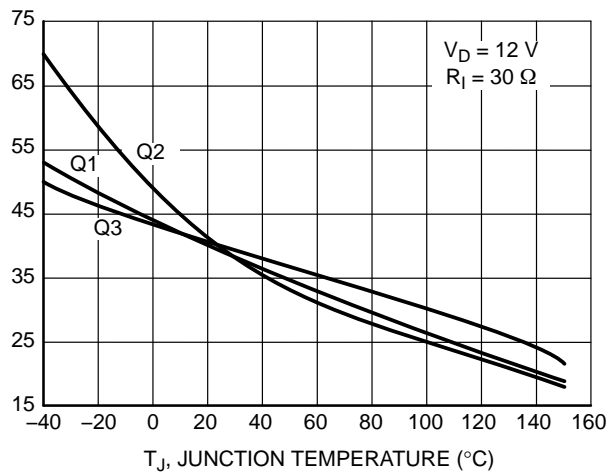
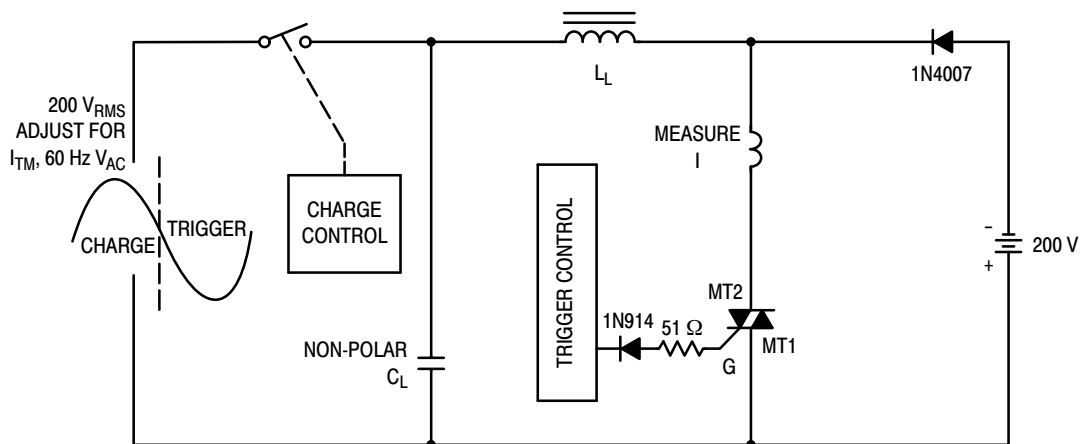


Figure 7. Critical Rate of Rise of Commutating Voltage



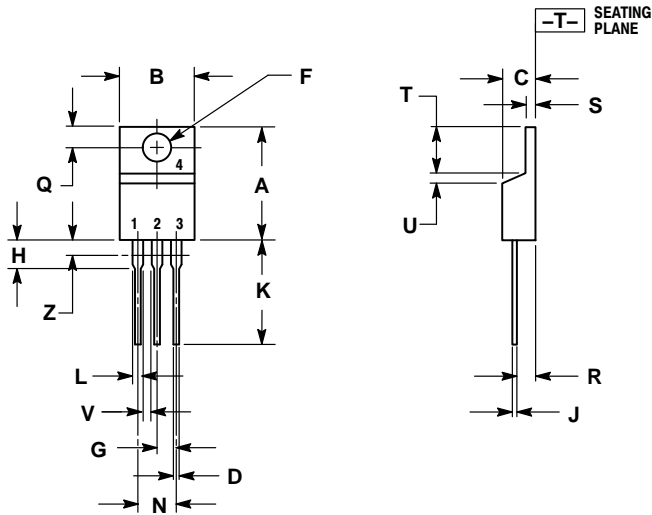
Note: Component values are for verification of rated  $(di/dt)_c$ . See AN1048 for additional information.

Figure 8. Simplified Test Circuit to Measure the Critical Rate of Rise of Commutating Current  $(di/dt)_c$

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## PACKAGE DIMENSIONS

TO-220  
CASE 221A-07  
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	0.014	0.022	0.36	0.55
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 12:

- PIN 1. MAIN TERMINAL 1
2. MAIN TERMINAL 2
3. GATE
4. NOT CONNECTED

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