

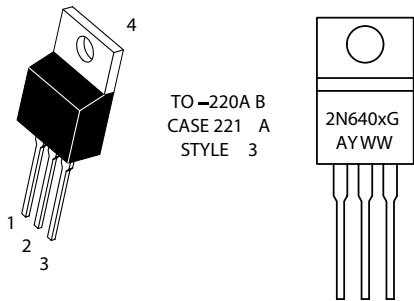
Description

Designed primarily for half-wave ac control applications, such as motor controls, heating controls and power supplies; or wherever half-wave silicon gate-controlled, solid-state devices are needed.

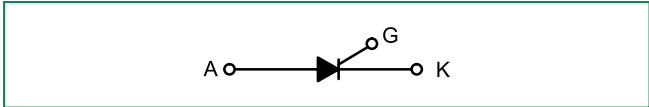
Features

- Glass Passivated Junctions for Greater Parameter Uniformity and Stability
- Small, Rugged, Thermowatt Construction for Low Thermal Resistance, High Heat Dissipation and Durability
- Blocking Voltage to 800 V
- These are Pb-Free devices

Pin Out



Functional Diagram



Additional Information



Datasheet



Resources



Samples

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

Rating	Part Number	Symbol	Value	Unit
Peak Repetitive Off-State Voltage (Note 1) ($T_J = -40$ to 110°C , Sine Wave, 50 to 60 Hz, Gate Open)	2N6400	V_{DRM} , V_{RRM}	50	V
	2N6401		100	
	2N6402		200	
	2N6403		400	
	2N6404		600	
	2N6405		800	
On-State RMS Current (180° Conduction Angles; $T_C = 100^\circ\text{C}$)		$I_{\text{T (RMS)}}$	16	A
Average On-State RMS Current (180° Conduction Angles; $T_C = 100^\circ\text{C}$)		$I_{\text{T (AV)}}$	10	A
Peak Non–Repetitive Surge Current (1/2 Cycle, Sine Wave, 60 Hz, $T_J = 90^\circ\text{C}$)		I_{TSM}	160	A
Circuit Fusing Considerations ($t = 8.3$ ms)		I^2t	145	A^2s
Forward Peak Gate Power (Pulse Width ≤ 1.0 μs , $T_C = 100^\circ\text{C}$)		P_{GM}	20	W
Forward Average Gate Power ($t = 8.3$ ms, $T_C = 100^\circ\text{C}$)		$P_{\text{G(AV)}}$	0.5	W
Forward Peak Gate Current (Pulse Width ≤ 1.0 μs , $T_C = 100^\circ\text{C}$)		I_{GM}	2.0	A
Operating Junction Temperature Range		T_J	-40 to +125	$^\circ\text{C}$
Storage Temperature Range		T_{stg}	-40 to +125	$^\circ\text{C}$

† Indicates JEDEC Registered Data

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.

- V_{DRM} and V_{RRM} for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; however, positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.

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

Rating	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta\text{JC}}$	1.5	$^\circ\text{C}/\text{W}$
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	$^\circ\text{C}$

† Indicates JEDEC Registered Data

Electrical Characteristics - OFF ($T_c = 25^\circ\text{C}$ unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
†Peak Repetitive Blocking Current ($V_{AK} = V_{DRM} = V_{RRM}$; Gate Open)	$T_J = 25^\circ\text{C}$	I_{DRM}	-	-	1.0	μA
	$T_J = 125^\circ\text{C}$	I_{RRM}	-	-	2.0	mA

Electrical Characteristics - ON

Characteristic		Symbol	Min	Typ	Max	Unit
†Peak Forward On-State Voltage ($I_{TM} = 32\text{ A Peak}$, Pulse Width $\leq 1\text{ ms}$, Duty Cycle $\leq 2\%$)		V_{TM}	-	-	1.7	V
†Gate Trigger Voltage (Continuous DC), All Quadrants (Continuous dc) ($V_D = 12\text{ Vdc}$, $R_L = 100\ \Omega$)	$T_c = 25^\circ\text{C}$	I_{GT}	-	9.0	30	mA
	$T_c = -40^\circ\text{C}$		-	-	60	
†Gate Trigger Voltage (Continuous dc) ($V_D = 12\text{ Vdc}$, $R_L = 100\ \Omega$)	$T_c = 25^\circ\text{C}$	V_{GT}	-	0.7	1.5	V
	$T_c = -40^\circ\text{C}$		-	-	2.5	
Gate Non-Trigger Voltage ($V_D = 12\text{ Vdc}$, $R_L = 100\ \Omega$)	$T_c = +125^\circ\text{C}$	V_{GD}	0.2	-	-	V
†Holding Current ($V_D = 12\text{ Vdc}$, Initiating Current = 200 mA, Gate Open)	$T_c = 25^\circ\text{C}$	I_H	-	18	40	mA
	$T_c = -40^\circ\text{C}$		-	-	60	
Turn-On Time ($I_{TM} = 12\text{ A}$, $I_{GT} = 40\text{ mAdc}$, $V_D = \text{Rated } V_{DRM}$)		t_{gt}	-	1.0	-	μs
Turn-Off Time ($I_{TM} = 16\text{ A}$, $I_R = 16\text{ A}$, $V_D = \text{Rated } V_{DRM}$)	$T_c = 25^\circ\text{C}$	t_q	-	15	-	μs
	$T_J = +125^\circ\text{C}$		-	35	-	

†Indicates JEDEC Registered Data

Dynamic Characteristics

Characteristic		Symbol	Min	Typ	Max	Unit
Critical Rate-of-Rise of Off-State Voltage ($V_D = \text{Rated } V_{DRM}$, Exponential Waveform)	$T_J = +125^\circ\text{C}$	$dv/dt(c)$	-	50	-	$\text{V}/\mu\text{s}$

Voltage Current Characteristic of SCR

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

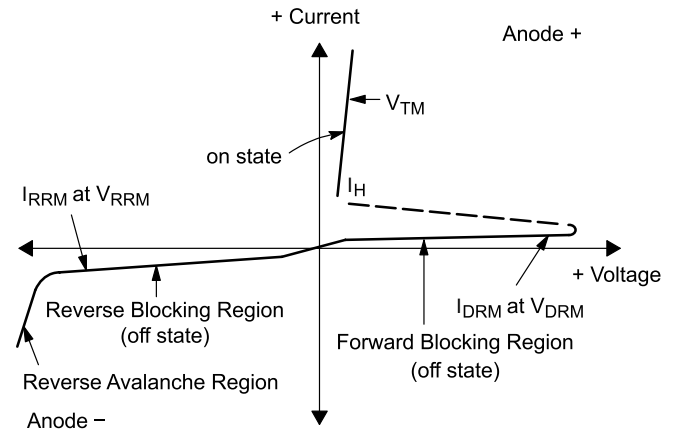


Figure 1. Current Derating

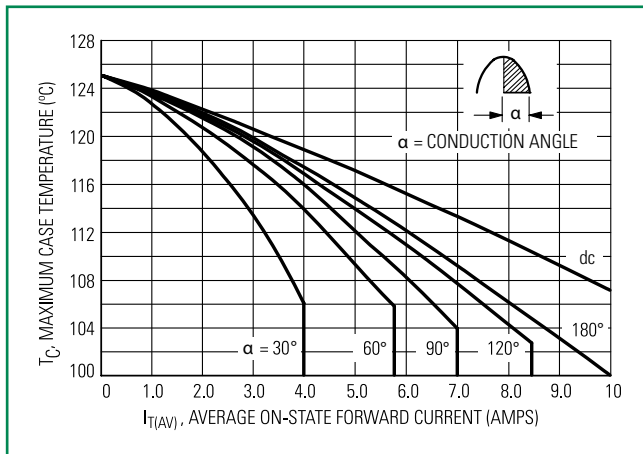


Figure 2. Maximum On-State Power Dissipation

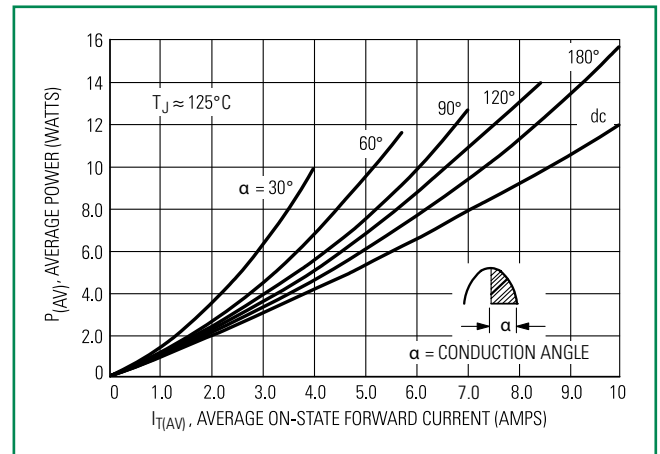


Figure 3. On-State Characteristics

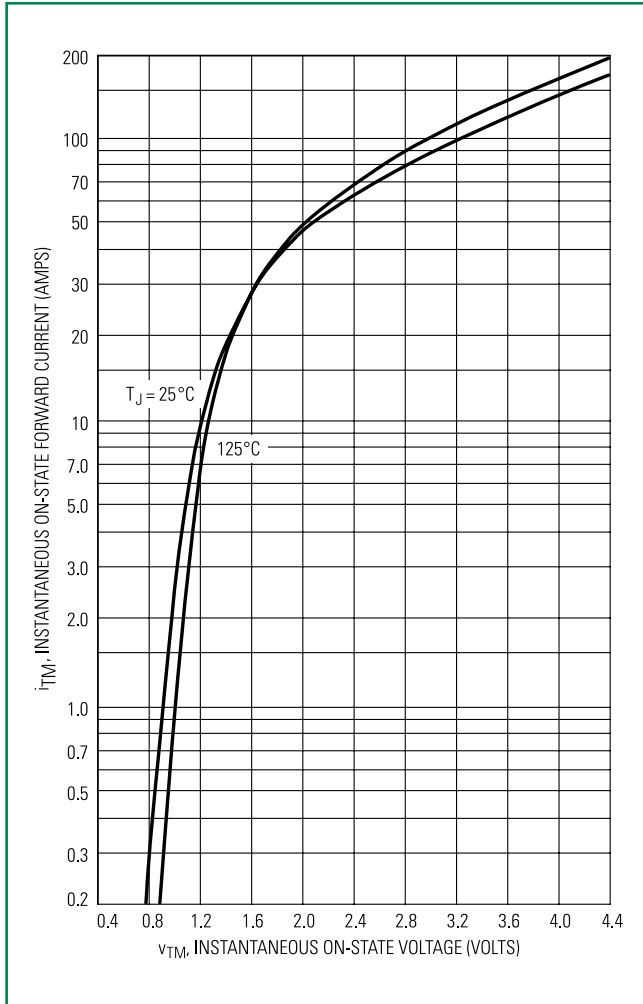


Figure 4. Maximum Non-Repetitive Surge Current

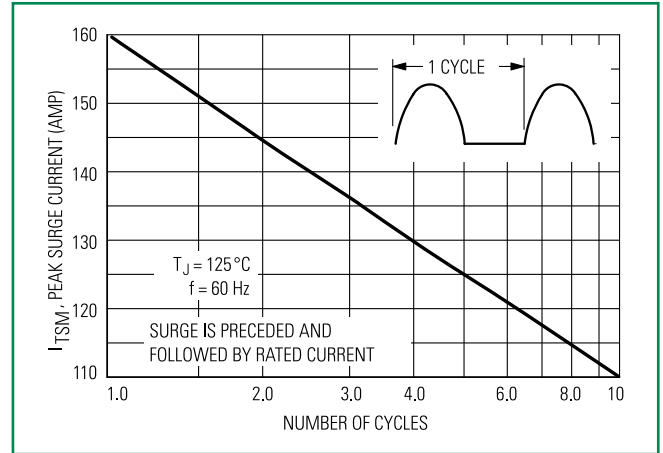
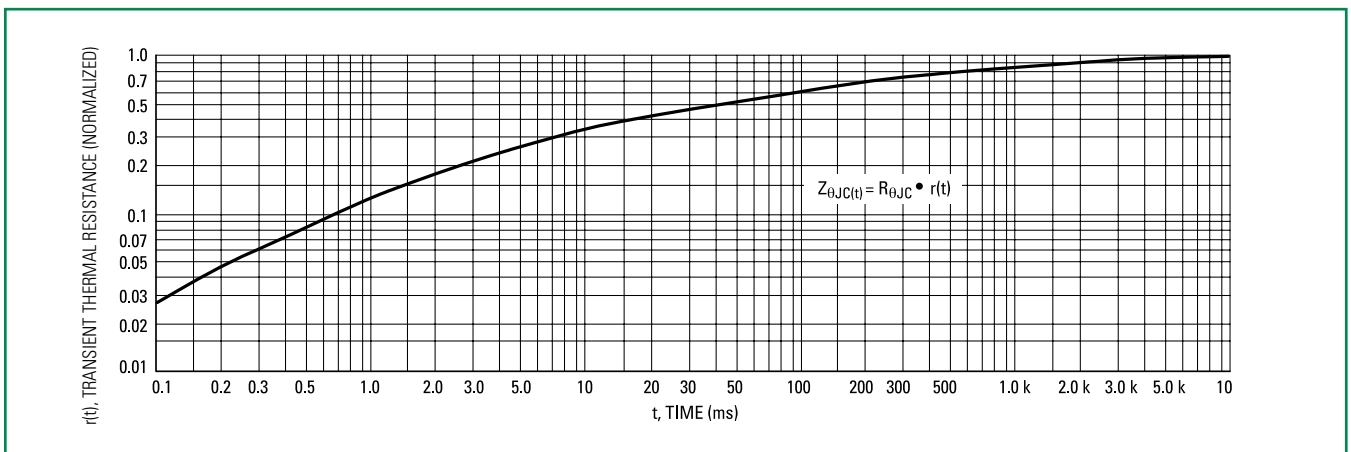


Figure 5. Thermal Response



Typical Characteristics

Figure 6. Typical Gate Trigger Current vs. Pulse Width

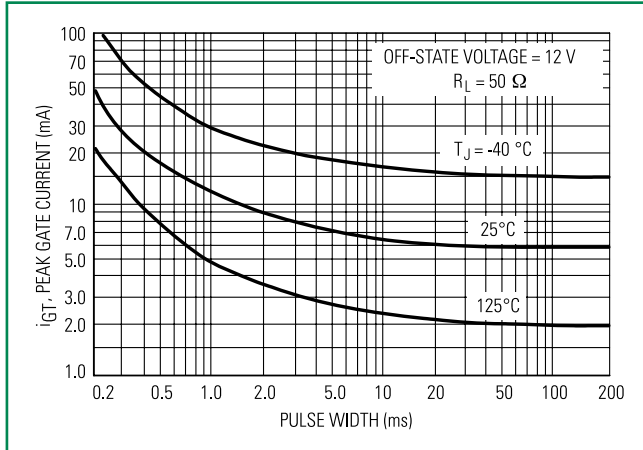


Figure 7. Typical Gate Trigger Current vs. Junction Temperature

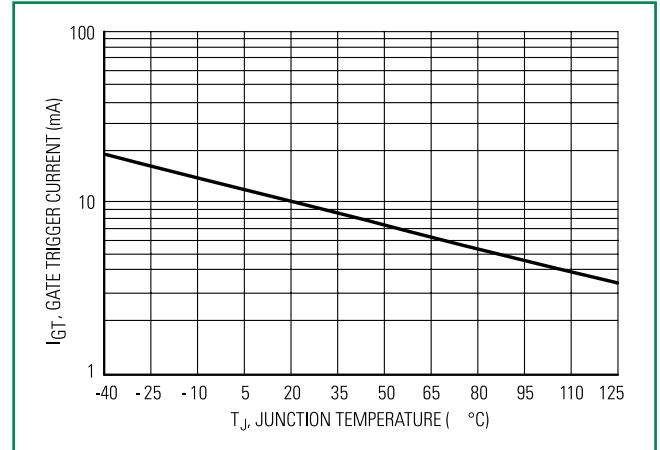


Figure 8. Typical Gate Trigger Voltage vs. Junction Temperature

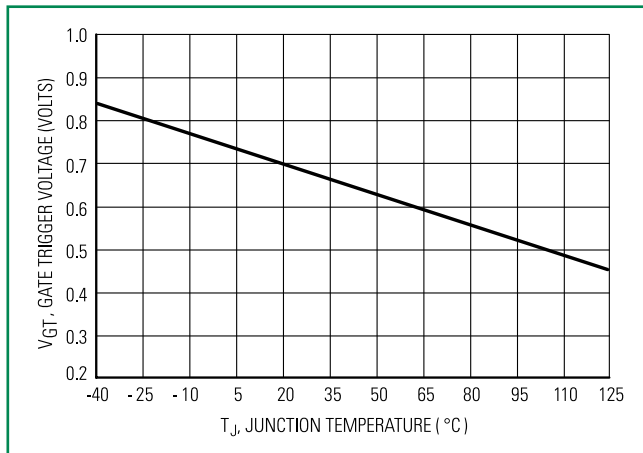
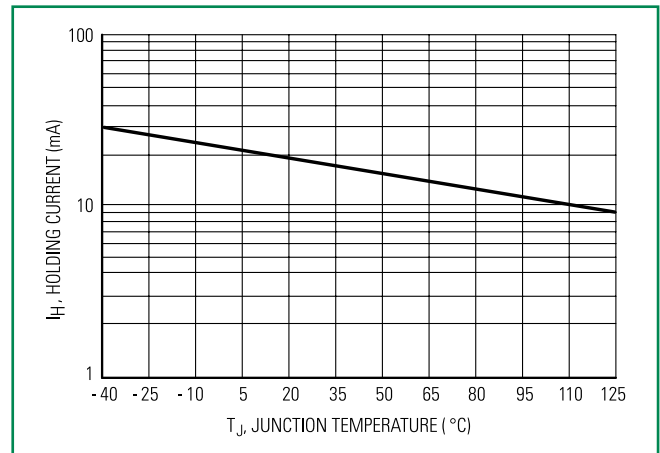
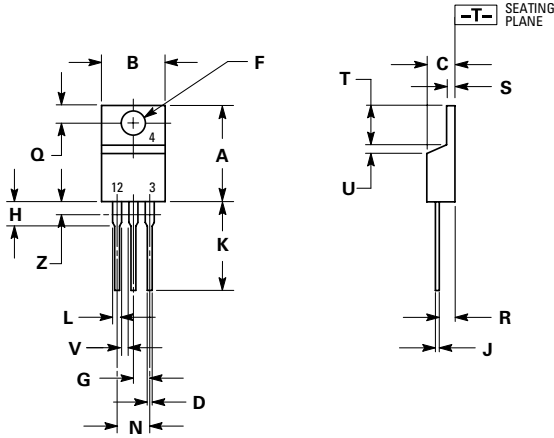


Figure 9. Typical Holding Current vs. Junction Temperature



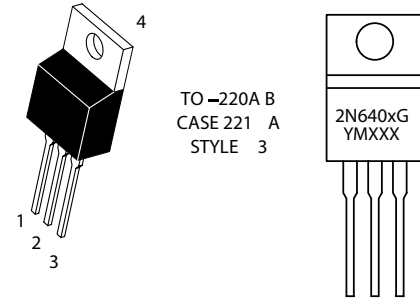
Dimensions



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

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.

Part Marking System



TO -220A B
CASE 221 A
STYLE 3

X= 0, 1, 2, 3, 4 or 5
Y= Year
M= Month
XXX= Lot Trace Code
G= Pb-Free Package

Pin Assignment

1	Cathode
2	Anode
3	Gate
4	Anode

Ordering Information

Device	Package	Shipping
2N6400G	TO-220AB (Pb-Free)	1000 Units / Box
2N6401G		
2N6402G		
2N6403G		50 Units / Tube
2N6403TG		
2N6404G		1000 Units / Box
2N6405G		

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