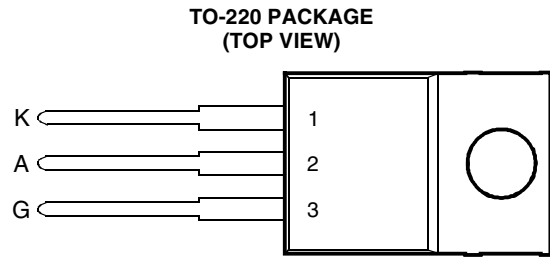**BOURNS**®

- **12 A Continuous On-State Current**
- **100 A Surge-Current**
- **Glass Passivated Wafer**
- **400 V to 800 V Off-State Voltage**
- **Max I_{GT} of 20 mA**

**TO-220 PACKAGE
(TOP VIEW)**

K — 1
A — 2
G — 3

Pin 2 is in electrical contact with the mounting base.

MDC1ACA

absolute maximum ratings over operating case temperature (unless otherwise noted)

RATING		SYMBOL	VALUE	UNIT
Repetitive peak off-state voltage	TIC126D	V_{DRM}	400	V
	TIC126M		600	
	TIC126S		700	
	TIC126N		800	
Repetitive peak reverse voltage	TIC126D	V_{RRM}	400	V
	TIC126M		600	
	TIC126S		700	
	TIC126N		800	
Continuous on-state current at (or below) 70°C case temperature (see Note 1)		$I_{T(RMS)}$	12	A
Average on-state current (180° conduction angle) at (or below) 70°C case temperature (see Note 2)		$I_{T(AV)}$	7.5	A
Surge on-state current at (or below) 25°C case temperature (see Note 3)		I_{TM}	100	A
Peak positive gate current (pulse width ≤ 300 μs)		I_{GM}	3	A
Peak gate power dissipation (pulse width ≤ 300 μs)		P_{GM}	5	W
Average gate power dissipation (see Note 4)		$P_{G(AV)}$	1	W
Operating case temperature range		T_C	-40 to +110	°C
Storage temperature range		T_{stg}	-40 to +125	°C
Lead temperature 1.6 mm from case for 10 seconds		T_L	230	°C

NOTES: 1. These values apply for continuous dc operation with resistive load. Above 70°C derate linearly to zero at 110°C.
2. This value may be applied continuously under single phase 50 Hz half-sine-wave operation with resistive load. Above 70°C derate linearly to zero at 110°C.
3. This value applies for one 50 Hz half-sine-wave when the device is operating at (or below) the rated value of peak reverse voltage and on-state current. Surge may be repeated after the device has returned to original thermal equilibrium.
4. This value applies for a maximum averaging time of 20 ms.

PRODUCT INFORMATION

1

BOURNS®

electrical characteristics at 25°C case temperature (unless otherwise noted)

	PARAMETER	TEST CONDITIONS			MIN	TYP	MAX	UNIT
I_{DRM}	Repetitive peak off-state current	V_D = rated V_{DRM}		T_C = 110°C			2	mA
I_{RRM}	Repetitive peak reverse current	V_R = rated V_{RRM}	I_G = 0	T_C = 110°C			2	mA
I_{GT}	Gate trigger current	V_{AA} = 12 V	R_L = 100 Ω	$t_{p(g)} \geq$ 20 µs		8	20	mA
V_{GT}	Gate trigger voltage	V_{AA} = 12 V $t_{p(g)} \geq$ 20 µs	R_L = 100 Ω	T_C = - 40°C			2.5	V
		V_{AA} = 12 V $t_{p(g)} \geq$ 20 µs	R_L = 100 Ω			0.8	1.5	
		V_{AA} = 12 V $t_{p(g)} \geq$ 20 µs	R_L = 100 Ω	T_C = 110°C	0.2			
I_H	Holding current	V_{AA} = 12 V Initiating I_T = 100 mA		T_C = - 40°C			100	mA
		V_{AA} = 12 V Initiating I_T = 100 mA					40	
V_T	On-state voltage	I_T = 12 A	(see Note 5)				1.4	V
dv/dt	Critical rate of rise of off-state voltage	V_D = rated V_D	I_G = 0	T_C = 110°C		400		V/µs

NOTE 5: This parameter must be measured using pulse techniques, t_p = 300 µs, duty cycle $\leq$ 2 %. Voltage sensing-contacts, separate from the current carrying contacts, are located within 3.2 mm from the device body.

thermal characteristics

	PARAMETER	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to case thermal resistance			2.4	°C/W
$R_{\theta JA}$	Junction to free air thermal resistance			62.5	°C/W

P R O D U C T   I N F O R M A T I O N

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THERMAL INFORMATION

AVERAGE ON-STATE CURRENT DERATING CURVE

TI03AE

Figure 1.

Y-axis: $I_{T(AV)}$ - Maximum Average On-State Current - A
X-axis: T_C - Case Temperature - °C

Continuous DC
$\Phi = 180°$
Φ Conduction Angle
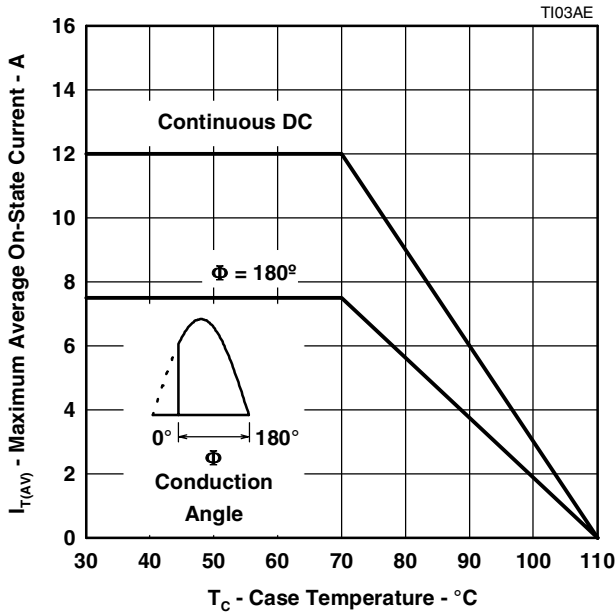
MAX ANODE POWER LOSS vs ON-STATE CURRENT

TI03AF

Figure 2.

$T_J = 110°C$

Y-axis: P_A - Max Continuous Anode Power Dissipated - W
X-axis: I_T - Continuous On-State Current - A
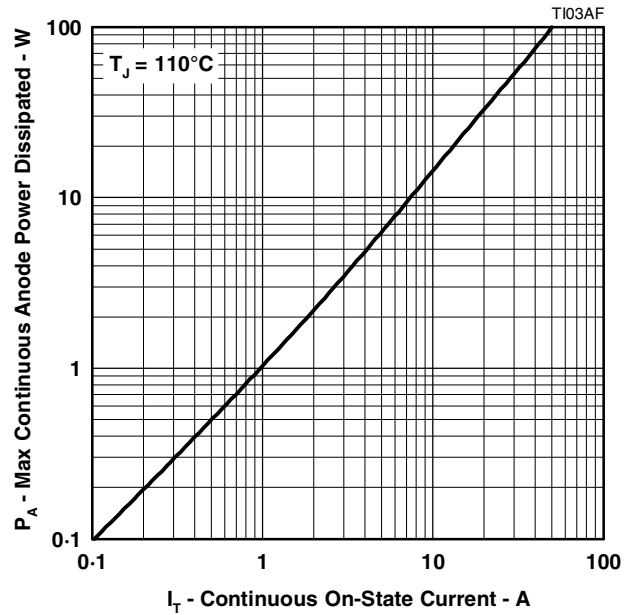
SURGE ON-STATE CURRENT vs CYCLES OF CURRENT DURATION

TI03AG

Figure 3.

Y-axis: I_{TM} - Peak Half-Sine-Wave Current - A
X-axis: Consecutive 50 Hz Half-Sine-Wave Cycles

$T_C \leq 70°C$
No Prior Device Conduction
Gate Control Guaranteed
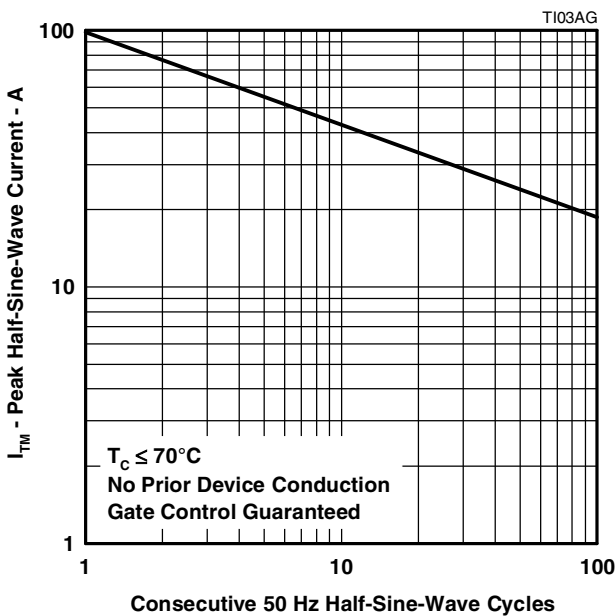
TRANSIENT THERMAL RESISTANCE vs CYCLES OF CURRENT DURATION
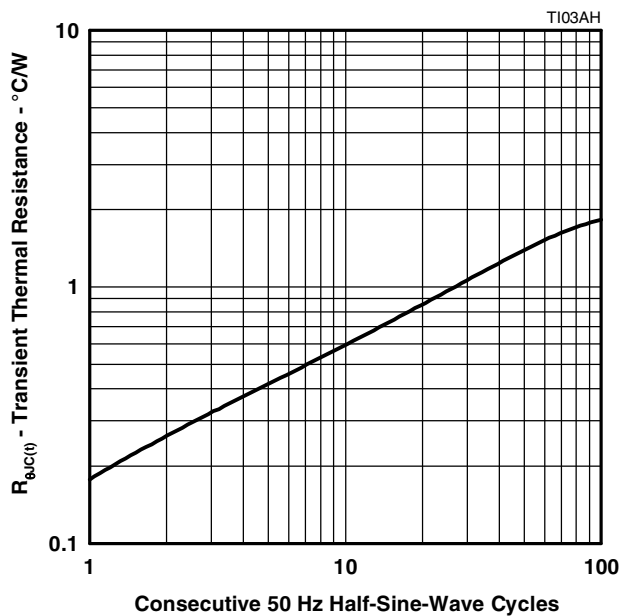
TI03AH

Figure 4.

Y-axis: $R_{\theta JC(t)}$ - Transient Thermal Resistance - °C/W
X-axis: Consecutive 50 Hz Half-Sine-Wave Cycles

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TYPICAL CHARACTERISTICS
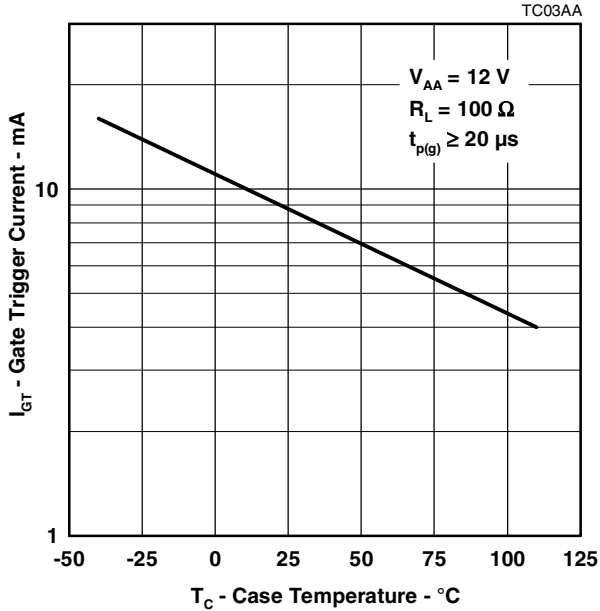
GATE TRIGGER CURRENT
vs
CASE TEMPERATURE

TC03AA

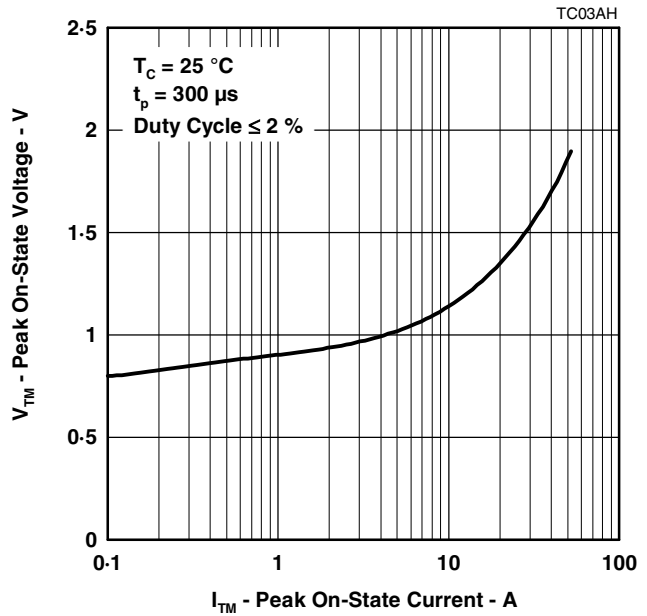V_{AA} = 12 V
R_L = 100 Ω
$t_{p(g)}$ ≥ 20 µs

X-axis: T_C - Case Temperature - °C
Y-axis: I_{GT} - Gate Trigger Current - mA

Figure 5.

GATE TRIGGER VOLTAGE
vs
CASE TEMPERATURE

TC03AB

V_{AA} =12 V
R_L = 100 Ω
$t_{p(g)}$ ≥ 20 µs

X-axis: T_C - Case Temperature - °C
Y-axis: V_{GT} - Gate Trigger Voltage - V
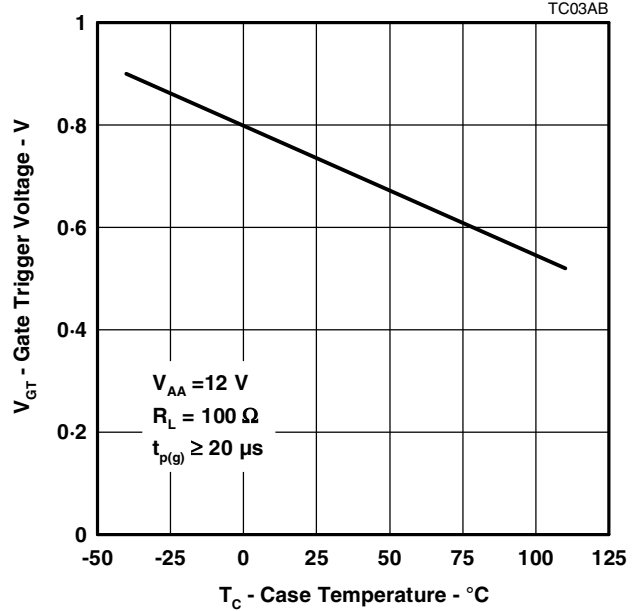
Figure 6.

HOLDING CURRENT
vs
CASE TEMPERATURE

TC03AD

V_{AA} = 12 V
Initiating I_T = 100 mA

X-axis: T_C - Case Temperature - °C
Y-axis: I_H - Holding Current - mA
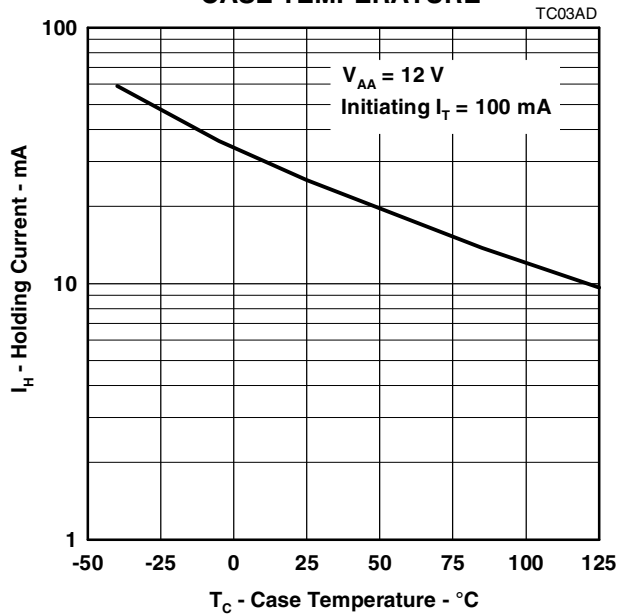
Figure 7.

PEAK ON-STATE VOLTAGE
vs
PEAK ON-STATE CURRENT

TC03AH

T_C = 25 °C
t_p = 300 µs
Duty Cycle ≤ 2 %

X-axis: I_{TM} - Peak On-State Current - A
Y-axis: V_{TM} - Peak On-State Voltage - V

Figure 8.

PRODUCT INFORMATION