

Powerex, Inc., Hillis Street, Youngwood, Pennsylvania 15697 (412)925-7272

Powerex Europe, S.A., 428 Avenue G. Durand, BP107, 72003 Le Mans, France(43) 72.75.15

High Frequency Gate-Turn-Off Thyristors

1600 Amperes/ 2000 & 2500 Volts

Description:

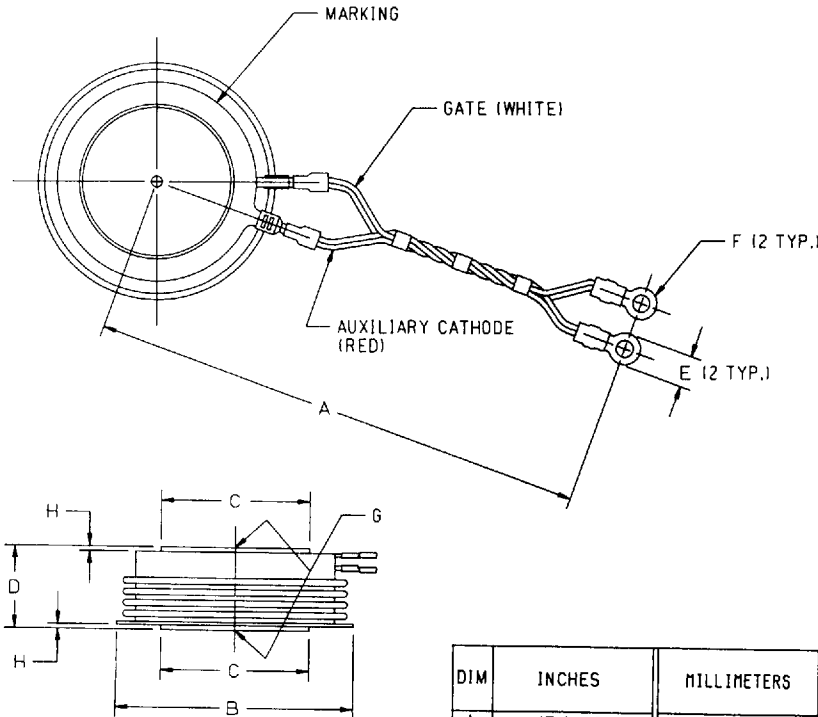
Powerex GTOs are designed for use in voltage-source inverter applications requiring fast switching GTOs with low snubber capacitances.

Features:

- Low Snubber Capacitance (1.5 μ F for 1600A switch)
- High Frequency Operation (1.5kHz)
- Low Switching Losses
- Fast Switching Time ($t_{gs} = 20\mu$ S maximum)
- Low On-State Voltage

Applications:

- Motor Control Inverters
- UPS Inverters
- Traction
- Choppers
- Induction Heaters
- DC to DC Converters



DIM	INCHES	MILLIMETERS
A	15.0 \pm .3	380 \pm 8
B	2.95 DIA. MAX	DIA. 75.0 MAX
C	1.85 DIA.	DIA. 47.0
D	1.02 \pm .02	26.0 \pm 0.5
E	.39	10.0
F	.21	5.4
G	.138 \pm .008 DIA. .087 \pm .008 DEEP	DIA. 3.50 \pm 0.20 DEEP 2.20 \pm 0.20
H	.016 MIN	MIN 0.40

Ordering Information

Example: Select the complete nine digit device part number from the table below.

DEVICE	CURRENT RATING	MANU. NUMBER	TYPE	VOLTAGE RATING
FG	1600	B	X	- 40 - 50
PRESS PACK GTO	I_{TORM} 1600 A		HIGH FREQUENCY High Voltage	V_{DRM} 40=2000V 50=2500V

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FG1600BX-40,50

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 Absolute Maximum Ratings, $T_J=25^\circ\text{C}$ unless otherwise specified

Characteristic	Symbol	FG1600BX-40	FG1600BX-50	Units
Repetitive Peak Reverse Voltage	V_{RRM}	17	17	Volts
Non-Repetitive Peak Reverse Voltage	V_{RSM}	17	17	Volts
DC Reverse Voltage	$V_{R(DC)}$	17	17	Volts
Repetitive Peak Off-State Voltage	V_{ORM}	2000	2500	Volts
Non-Repetitive Peak Off-State Voltage	V_{OSM}	2100	2500	Volts
DC Off-State Voltage	$V_{O(DC)}$	1600	2000	Volts
Controllable On-State Current	$V_D=1/2V_{DRM}, T_J=125^\circ\text{C}, C_s=1.5\mu\text{F}$ $L_s=0.25\mu\text{H}, I_{GC}=-200\text{A}$		$I_{T(IRM)}$	1600 A
RMS On-State Current			$I_{T(RMS)}$	785 A
Average On-State Current	Sine-wave $\Theta=180^\circ, T_s=71^\circ\text{C}, f=60\text{ Hz}$		$I_{T(AV)}$	500 A
Surge On-State Current	NON-REP, One half cycle at 60Hz		I_{TSM}	7800 A
I^2t for Fusing	One half cycle at 60 Hz		I^2t	250,000 A ² -sec
Critical Rate of Rise of On-State Current	$V_D=1/2 V_{DRM}, I_{GM}=30\text{A}, T_J=125^\circ\text{C}$		di/dt	600 A/ μS
Peak Gate Forward Current			I_{FGM}	60 A
Peak Gate Reverse Current			I_{RGM}	500 A
Peak Gate Forward Voltage			V_{FGM}	10 V
Peak Gate Reverse Voltage			V_{RGM}	17 V
Peak Gate Forward Power Dissipation			P_{FGM}	240 W
Peak Gate Reverse Power Dissipation			P_{RGM}	15000 W
Average Gate Forward Power Dissipation			$P_{FG(AV)}$	45 W
Average Gate Reverse Power Dissipation			$P_{RG(AV)}$	100 W
Junction Temperature			T_J	-40 TO +125 °C
Storage Temperature			T_{stg}	-40 TO +150 °C
Mounting Force	RECOMMENDED VALUE 17.6 kN or 3970 lbs.			15.7 TO 20.6 kN 3530 TO 4630 lbs.
Weight (typical)				530 grams

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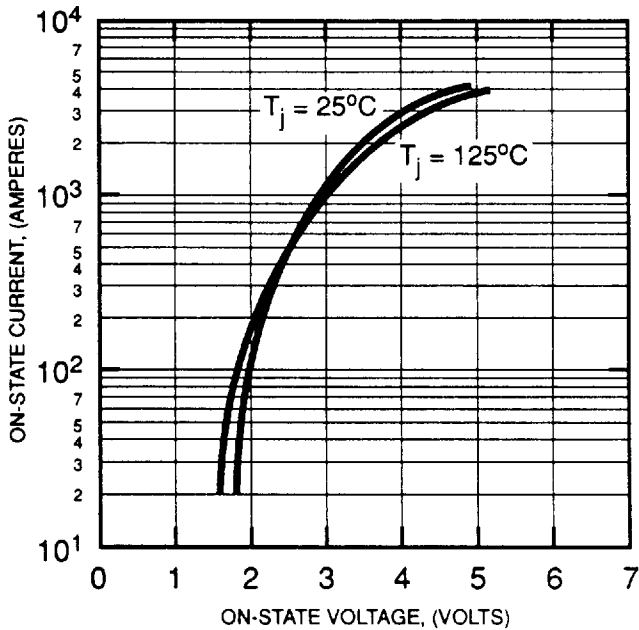
Electrical Characteristics, $T_j=25^\circ\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Repetitive Peak Reverse Leakage Current	I_{RRM}	$T_j=125^\circ\text{C}$, $V_R=V_{RRM}$	-----	-----	90	mA
Repetitive Peak Forward Leakage Current	I_{DRM}	$T_j=125^\circ\text{C}$, $V_D=V_{DRM}$, $V_{GK}=-2\text{V}$	-----	-----	90	mA
Gate Reverse Blocking Current	I_{RG}	$T_j=125^\circ\text{C}$, $V_{RG}=-15\text{V}$	-----	-----	90	mA
Peak On-State Voltage	V_{TM}	$T_j=125^\circ\text{C}$, $I_{TM}=1600\text{A}$	-----	-----	3.5	V
Critical Rate of Rise of Off-State Voltage	dv/dt	$T_j=125^\circ\text{C}$, $V_D=50\% V_{DRM}$, $V_{GK}=-2\text{V}$	1000	-----	-----	V/ μs
Turn-Off Time	t_{qo}	$I_{TM}=1600\text{A}$, $T_j=125^\circ\text{C}$, $V_{GR}=-17\text{V}$, $C_g=1.5\mu\text{F}$, $L_s=0.25\mu\text{H}$ $di_d/dt=30\text{A}/\mu\text{s}$, $V_D=50\% V_{DRM}$	-----	-----	20	μs
Critical Off-Bias Time ($t_{qo} + t_{ow}$)	t_{ow}				65	μs
Turn-On Time	t_{qt}	$I_{TM}=1600\text{A}$, $T_j=125^\circ\text{C}$, $I_{GM}=25\text{A}$, $V_D=1/2 V_{DRM}$	-----	-----	10	μs
Gate Trigger Current	I_{GT}	$V_D=5\text{V TO } 20\text{V}$, $I_T=25\text{A TO } 200\text{A}$	-----	-----	3.0	A
Gate Trigger Voltage	V_{GT}	$V_D=5\text{V TO } 20\text{V}$, $I_T=25\text{A TO } 200\text{A}$	-----	-----	1.5	V

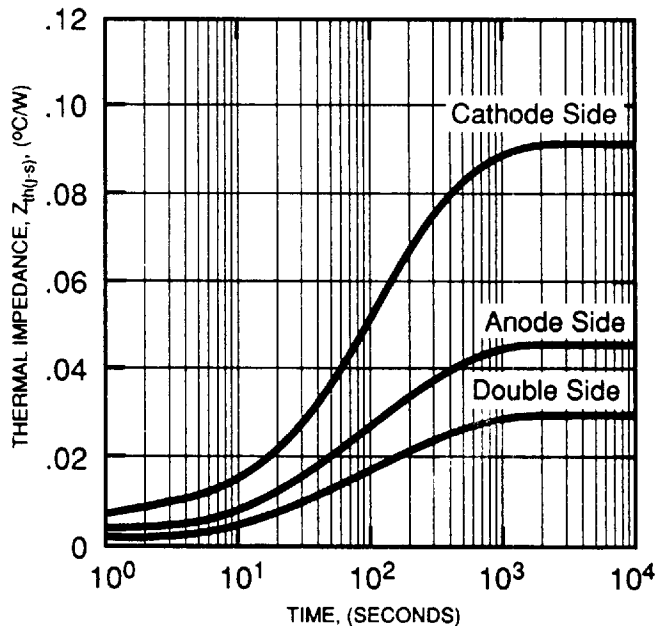
Thermal Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Units
Thermal Resistance Junction to Sink	$R_{\theta JS}$	-----	-----	0.030	$^\circ\text{C}/\text{W}$

MAXIMUM ON-STATE CHARACTERISTIC



TRANSIENT THERMAL IMPEDANCE CHARACTERISTIC, (JUNCTION TO SINK)

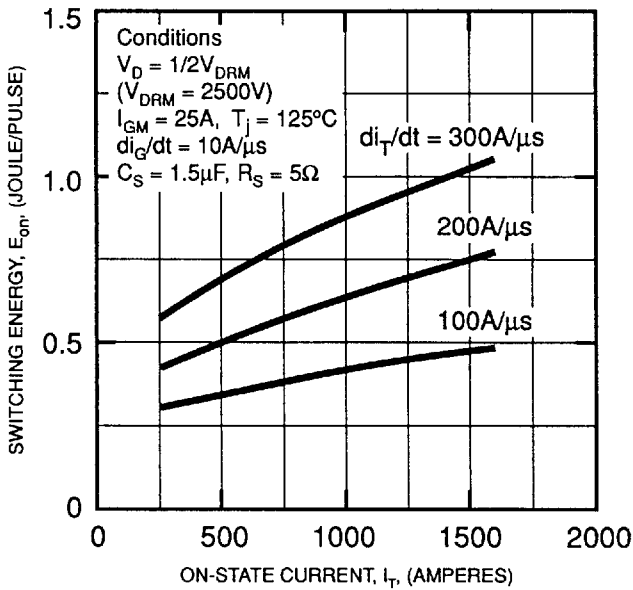




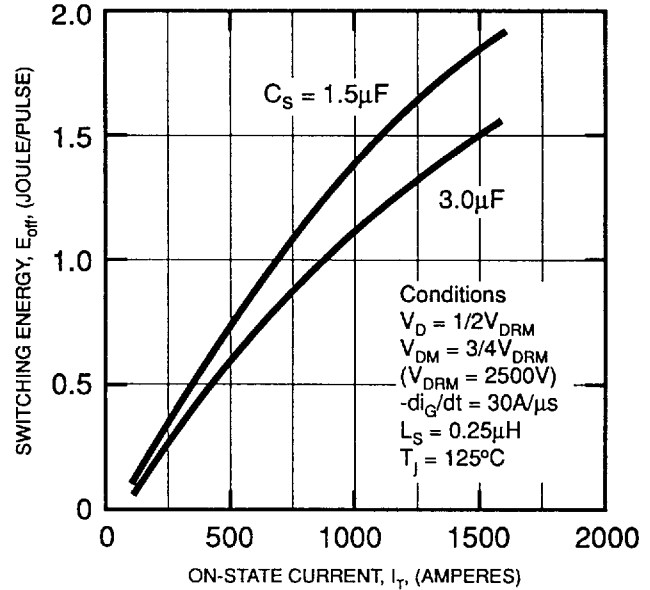
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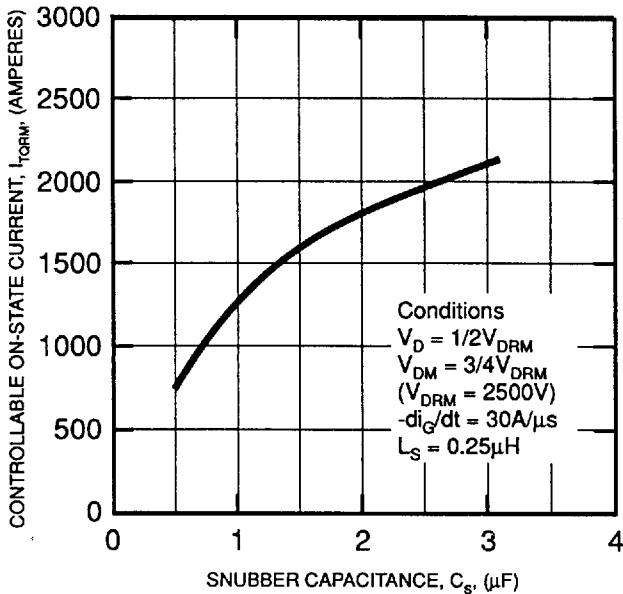
MAXIMUM TURN-ON SWITCHING ENERGY DISSIPATION PER PULSE



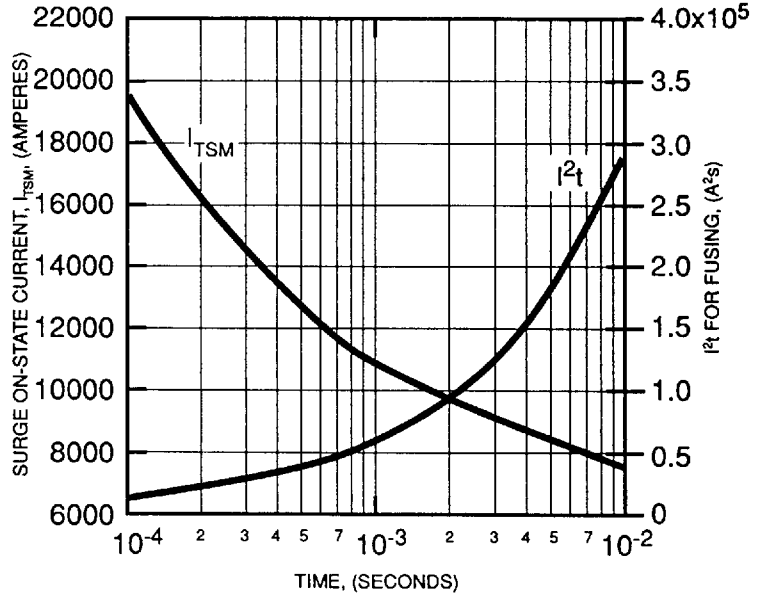
MAXIMUM TURN-OFF SWITCHING ENERGY DISSIPATION PER PULSE



MAXIMUM CONTROLLABLE ON-STATE CURRENT VS. SNUBBER CAPACITANCE



PEAK ONE-CYCLE ON-STATE SURGE CURRENT AND I²t



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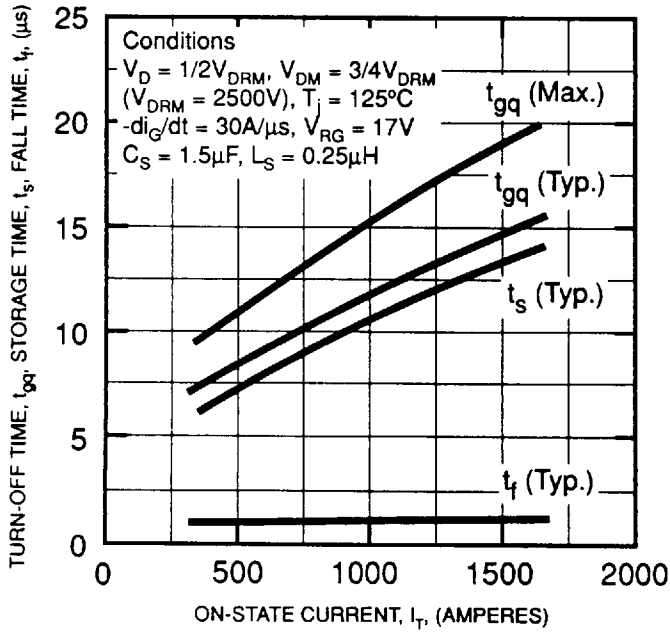
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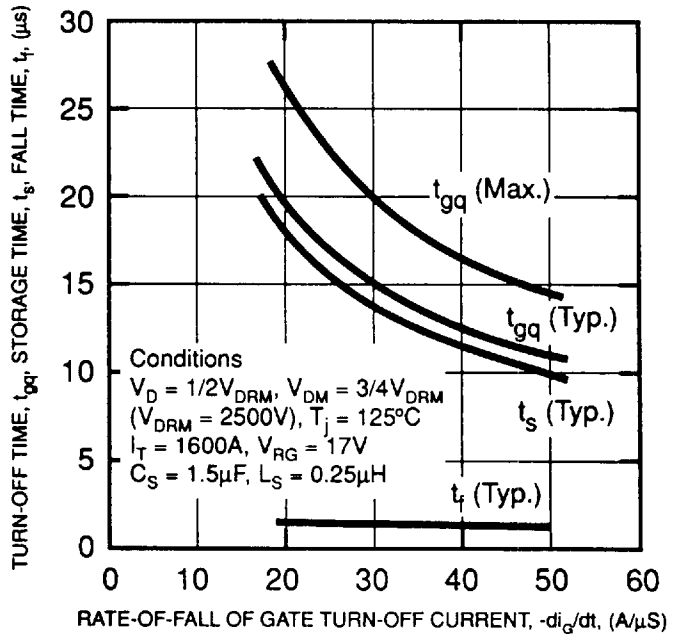
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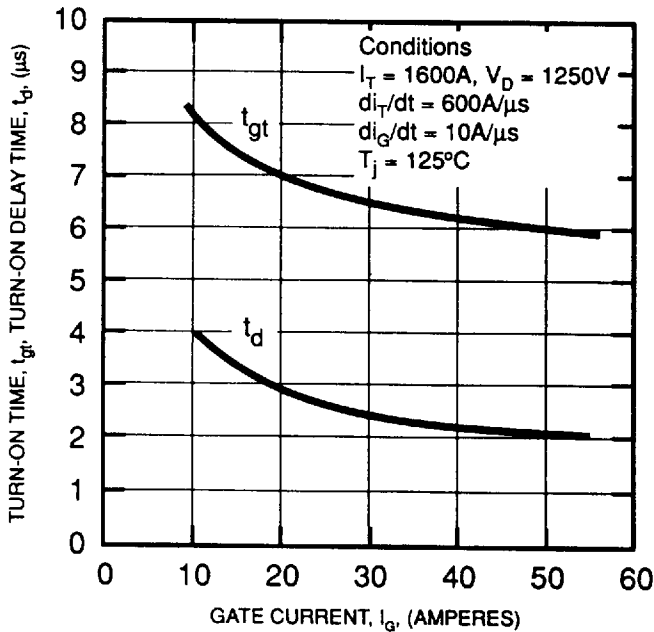
TURN-OFF TIME, STORAGE TIME, FALL TIME VS. ON-STATE CURRENT



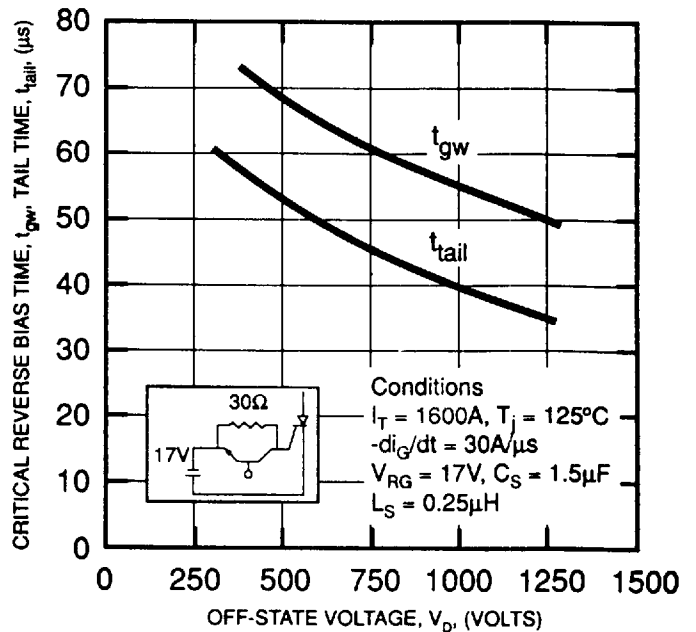
TURN-OFF TIME, STORAGE TIME, FALL TIME VS. RATE-OF-FALL OF GATE TURN-OFF CURRENT



TYPICAL TURN-ON TIME, TURN-ON DELAY TIME VS. GATE CURRENT



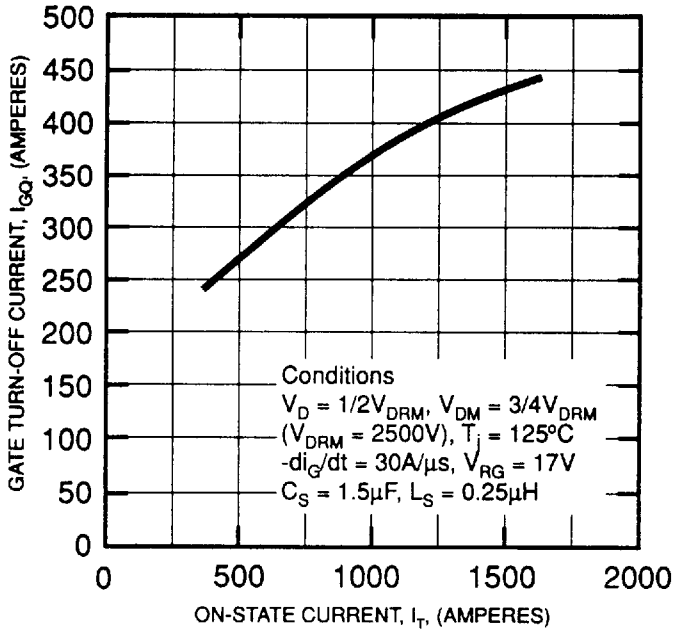
MAXIMUM CRITICAL REVERSE BIAS TIME, TAIL TIME VS. OFF-STATE VOLTAGE



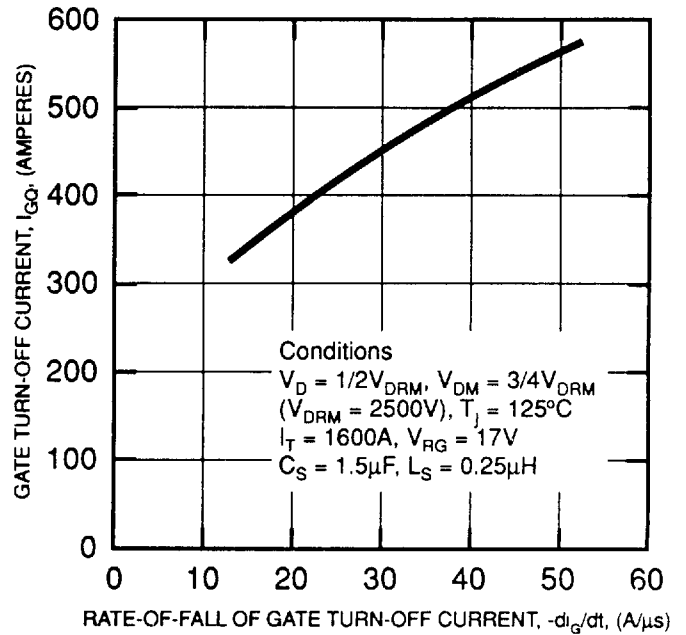
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MAXIMUM GATE TURN-OFF CURRENT VS. ON-STATE CURRENT



MAXIMUM GATE TURN-OFF CURRENT VS. RATE-OF-FALL OF GATE TURN-OFF CURRENT



MAXIMUM GATE TRIGGER VOLTAGE, GATE TRIGGER CURRENT VS. JUNCTION TEMPERATURE

