

International IOR Rectifier

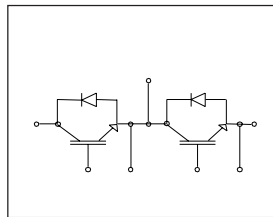
GA200TS60UX

"HALF-BRIDGE" IGBT INT-A-PAK

Ultra-Fast™ Speed IGBT

Features

- Generation 4 IGBT technology
- UltraFast: Optimized for high operating frequencies 8-40 kHz in hard switching, >200 kHz in resonant mode
- Very low conduction and switching losses
- HEXFRED™ antiparallel diodes with ultra-soft recovery
- Industry standard package
- UL approved



$V_{CES} = 600V$
 $V_{CE(on)} \text{ typ.} = 1.74V$
 @ $V_{GE} = 15V, I_C = 200A$

Benefits

- Increased operating efficiency
- Direct mounting to heatsink
- Performance optimized for power conversion: UPS, SMPS, Welding
- Low EMI, requires less snubbing



INT-A-PAK

Absolute Maximum Ratings

Parameters	Max	Units
V_{CES} Collector-to-Emitter Voltage	600	V
I_C Continuous Collector Current @ $T_C = 25^\circ C$	265	A
I_{CM} Pulsed Collector Current	400	
I_{LM} Peak Switching Current	400	
I_{FM} Peak Diode Forward Current	400	
V_{GE} Gate-to-Emitter Voltage	± 20	V
V_{ISOL} RMS Isolation Voltage, Any Terminal to Case, $t = 1 \text{ min}$	2500	
P_D Maximum Power Dissipation	@ $T_C = 25^\circ C$	W
	@ $T_C = 85^\circ C$	

Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Parameters	Min	Typ	Max	Units	Test Conditions
V_{BRCES} Collector-to-Emitter Breakdown Voltage	600			V	$V_{GE} = 0V, I_C = 1mA$
$V_{CE(on)}$ Collector-to-Emitter Voltage		1.74	2.2		$V_{GE} = 15V, I_C = 200A$
		1.79	2.25		$V_{GE} = 15V, I_C = 200A, T_J = 125^\circ\text{C}$
$V_{GE(th)}$ Gate Threshold Voltage	3	4.4	6		$I_C = 0.25mA$
$\Delta V_{GE(th)}/\Delta T_J$ Temperat. Coeff. of Threshold Voltage		- 11		mV/ $^\circ\text{C}$	$V_{CE} = V_{GE}, I_C = 0.25mA$
g_{fe} Forward Transconductance		220		S	$V_{CE} = 20V, I_C = 200A$
I_{CES} Collector-to-Emitter Leakage Current		0.014	1	mA	$V_{GE} = 0V, V_{CE} = 600V$
			10		$V_{GE} = 0V, V_{CE} = 600V, T_J = 125^\circ\text{C}$
V_{FM} Diode Forward Voltage drop		4.2	6.0	V	$I_C = 200A, V_{GE} = 0V$
		4.4	6.2		$I_C = 200A, V_{GE} = 0V, T_J = 125^\circ\text{C}$
I_{GES} Gate-to-Emitter Leakage Current			± 250	nA	$V_{GE} = \pm 20V$

Switching Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Parameters	Min	Typ	Max	Units	Test Conditions
Q_g Total Gate Charge		900		nC	$I_C = 200A$ $I_C = 270A, V_{GE} = 15V$
Q_{ge} Gate-Emitter Charge		125			
Q_{gc} Gate-Collector Charge		306			
$t_{d(on)}$ Turn-On Delay Time		342		ns	$I_C = 200A$ $V_{CC} = 360V$ $V_{GE} = \pm 15V$
t_r Rise Time		194			
$t_{d(off)}$ Turn-Off Delay Time		366			
t_f Fall Time		213			
E_{on} Turn-On Switching Energy		5		mJ	
E_{off} Turn-Off Switching Energy		16			$T_J = 125^\circ\text{C}$ $R_{G1} = 15\Omega$ $R_{G2} = 0\Omega$
E_{ts} Total Switching Energy		21			
C_{ies} Input Capacitance	—	20068	—		
C_{oes} Output Capacitance	—	1254	—	pF	$V_{GE} = 0V$ $V_{CC} = 30V$ $f = 1\text{ MHz}$
C_{res} Reverse Transfer Capacitance	—	261	—		
t_{rr} Diode Reverse Recovery Time	—	179	—	ns	$I_C = 200A$ $V_{CC} = 360V$ $di/dt = 1300A/\mu s$
I_{rr} Diode Peak Reverse Current	—	120	—	A	
Q_{rr} Diode Recovery Charge	—	10714	—	μC	
$di_{(rec)}/dt$ Diode Peak Rate of Fall of Recovery During t_b	—	1922	—	A/ μs	

Thermal- Mechanical Specifications

Parameters	Min	Typ	Max	Units
T_J Operating Junction Temperature Range	- 40		150	$^\circ\text{C}$
T_{STG} Storage Temperature Range	- 40		125	
R_{thJC} Junction-to-Case IGBT			0.2	$^\circ\text{C}/W$
Per Diode			0.4	
R_{thCS} Case-to-Sink Per Module		0.1		
T Mounting torque Case to heatsink			6	Nm
Case to terminal 1, 2, 3			5	
Weight		200		g

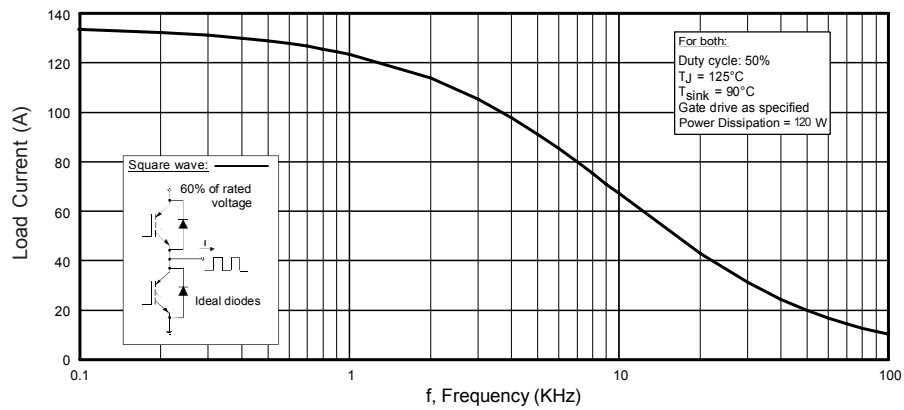


Fig. 1 - Typical Load Current vs. Frequency
(Load Current = I_{RMS} of fundamental)

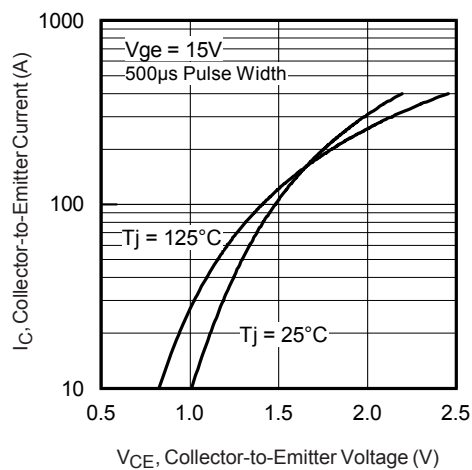


Fig. 2 - Typical Output Characteristics

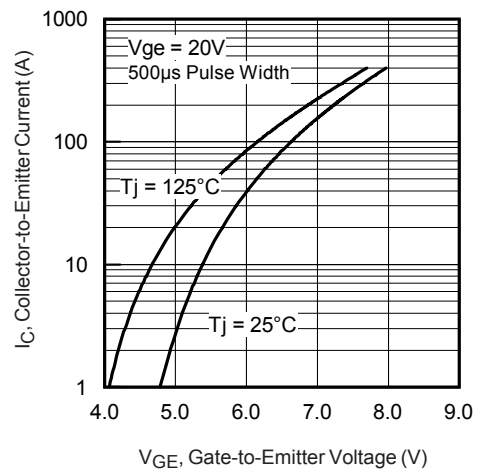


Fig. 3 - Typical Transfer Characteristics

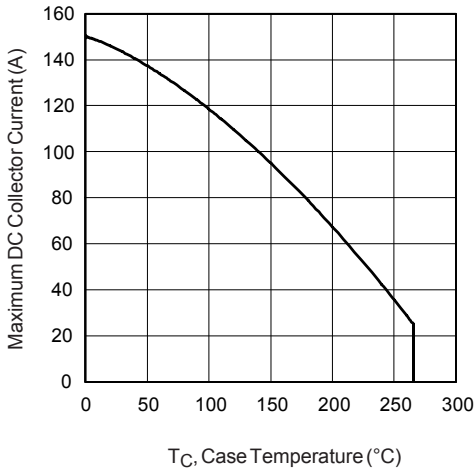


Fig. 4 - Maximum Collector Current vs. Case Temperature

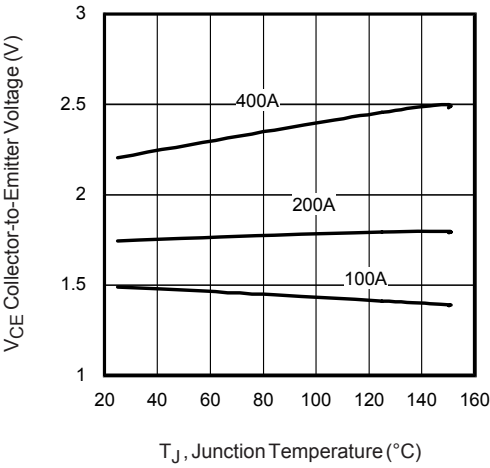


Fig. 5 - Typical Collector-to-Emitter Voltage vs. Junction Temperature

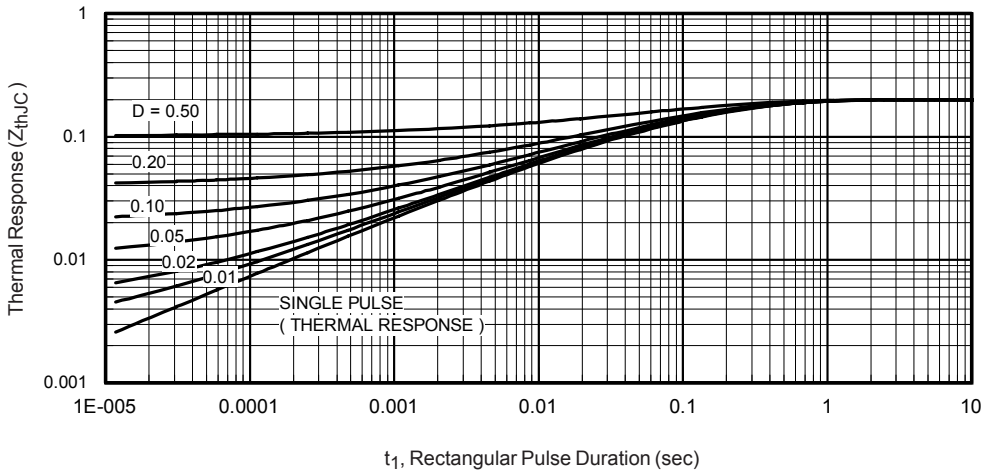


Fig. 6 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

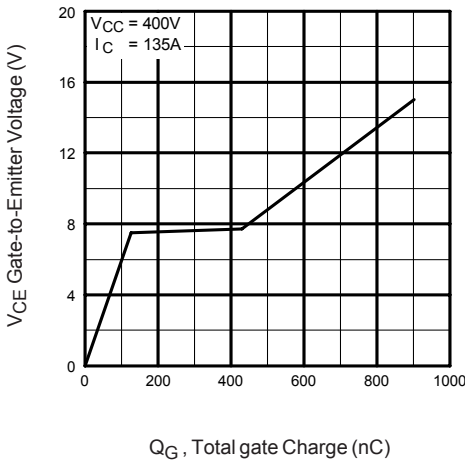


Fig. 7 - Typical Gate Charge vs. Gate-to-Emitter Voltage

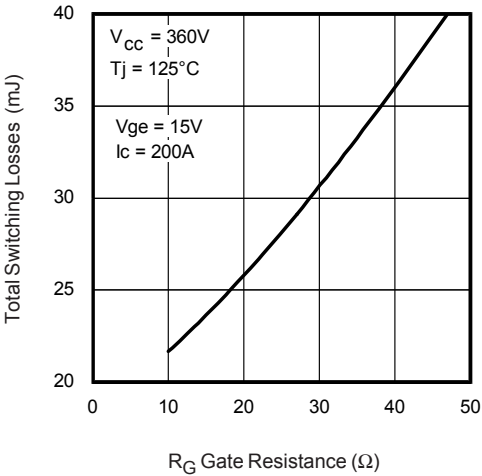


Fig. 8 - Typ. Switching Losses vs. Gate Resistance

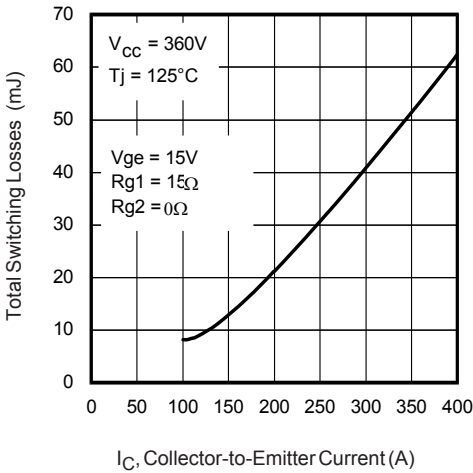


Fig. 9 - Typ. Switching Losses vs. Collector-to-Emitter Current

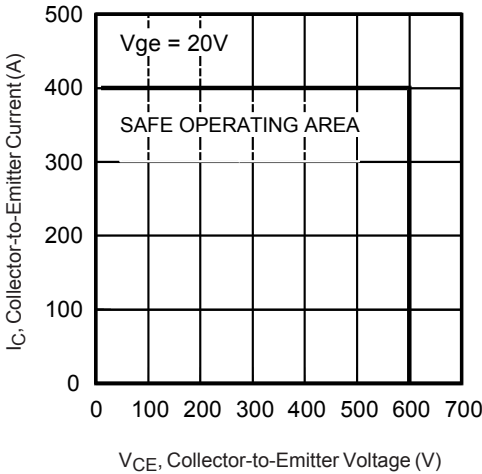


Fig. 10 - Reverse Bias SOA

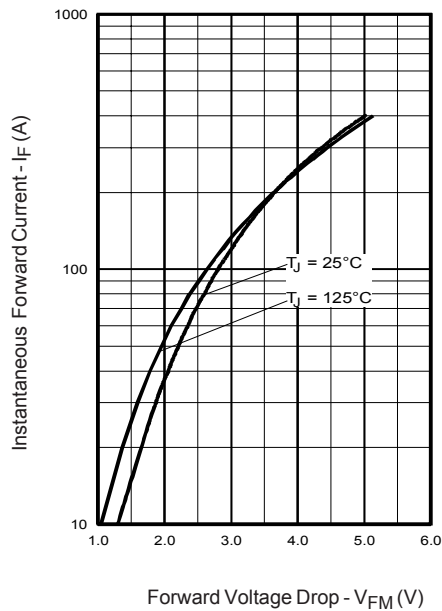


Fig. 11 - Typ. Forward Voltage Drop vs. Instantaneous Forward Current

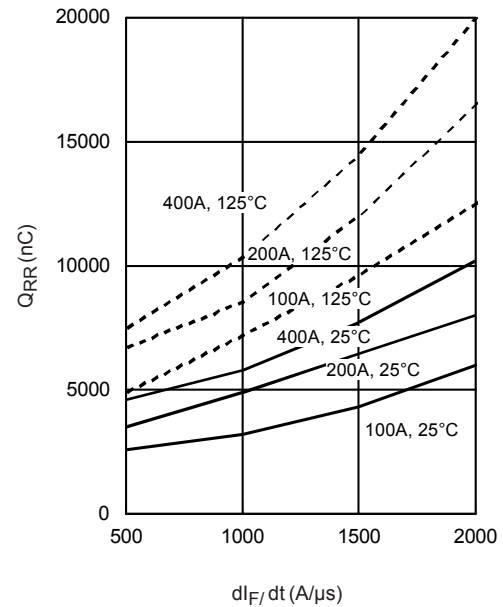


Fig. 12 - Typical Stored Charge vs. dI_F / dt

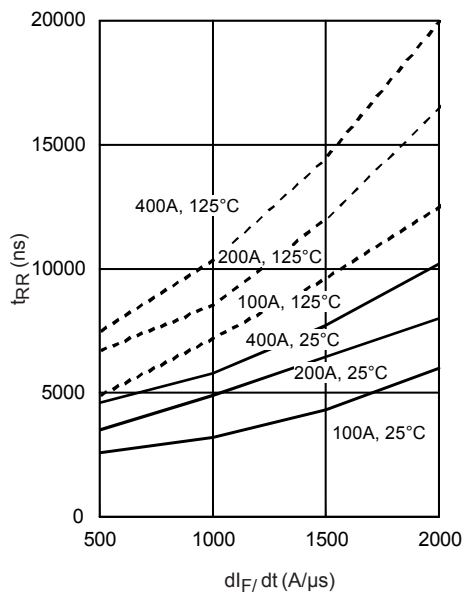


Fig. 13 - Typical Reverse Recovery vs. dI_F / dt

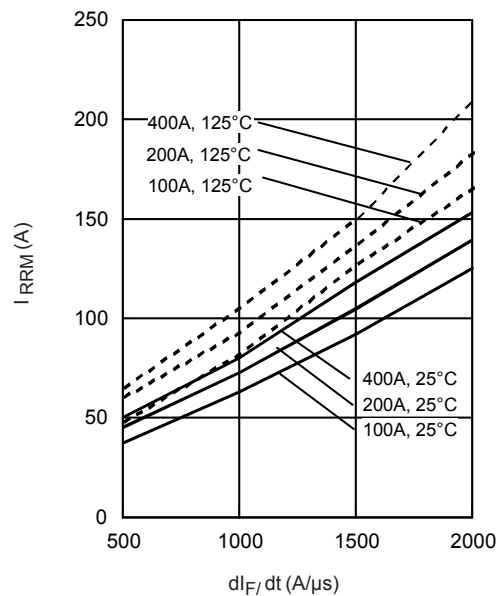


Fig. 14 - Typical Reverse Recovery vs. dI_F / dt

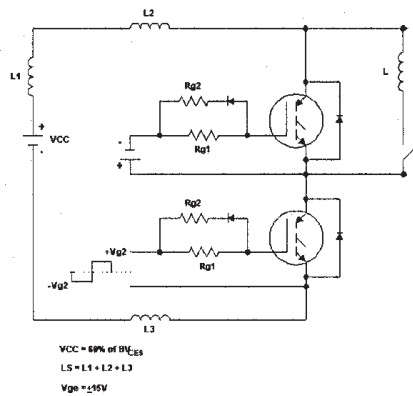


Fig. 15a - Test Circuit for Measurement of I_{LM} ,
 E_{on} , $E_{off}(\text{diode})$, t_{rr} , Q_{rr} , I_{rr} , $t_{d(on)}$, t_r , $t_{d(off)}$, t_f

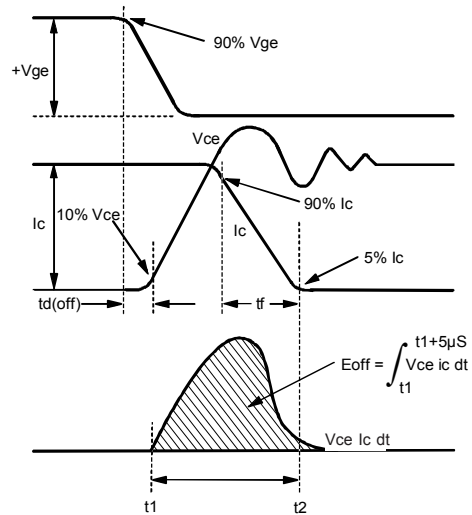


Fig. 15b - Test Waveforms for Circuit of Fig. 18a, Defining
 E_{off} , $t_{d(off)}$, t_f

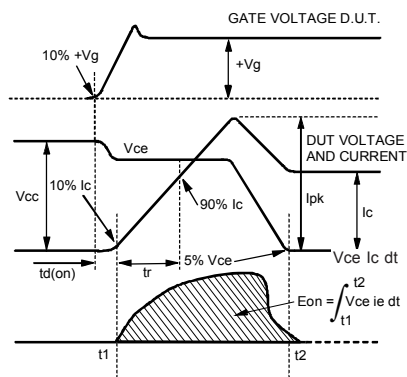


Fig. 15c - Test Waveforms for Circuit of Fig. 18a,
Defining E_{on} , $t_{d(on)}$, t_r

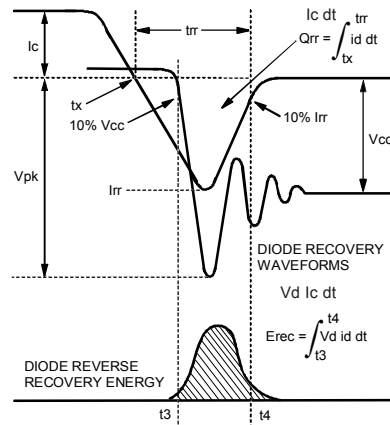


Fig. 15d - Test Waveforms for Circuit of Fig. 18a,
Defining E_{rec} , t_{rr} , Q_{rr} , I_{rr}

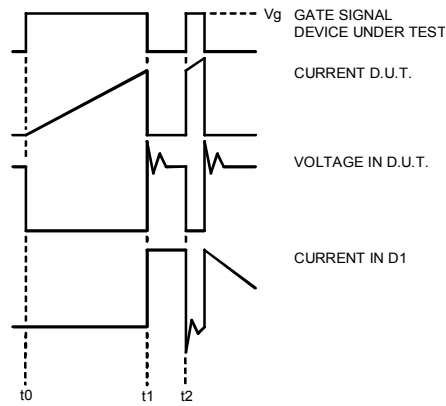


Figure 15e. Macro Waveforms for Figure 18a's Test Circuit

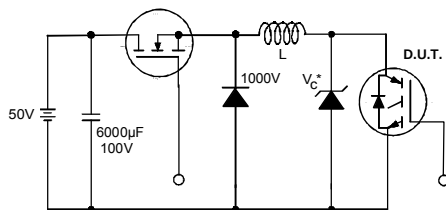


Figure 16. Clamped Inductive Load Test Circuit

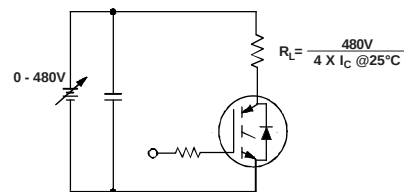
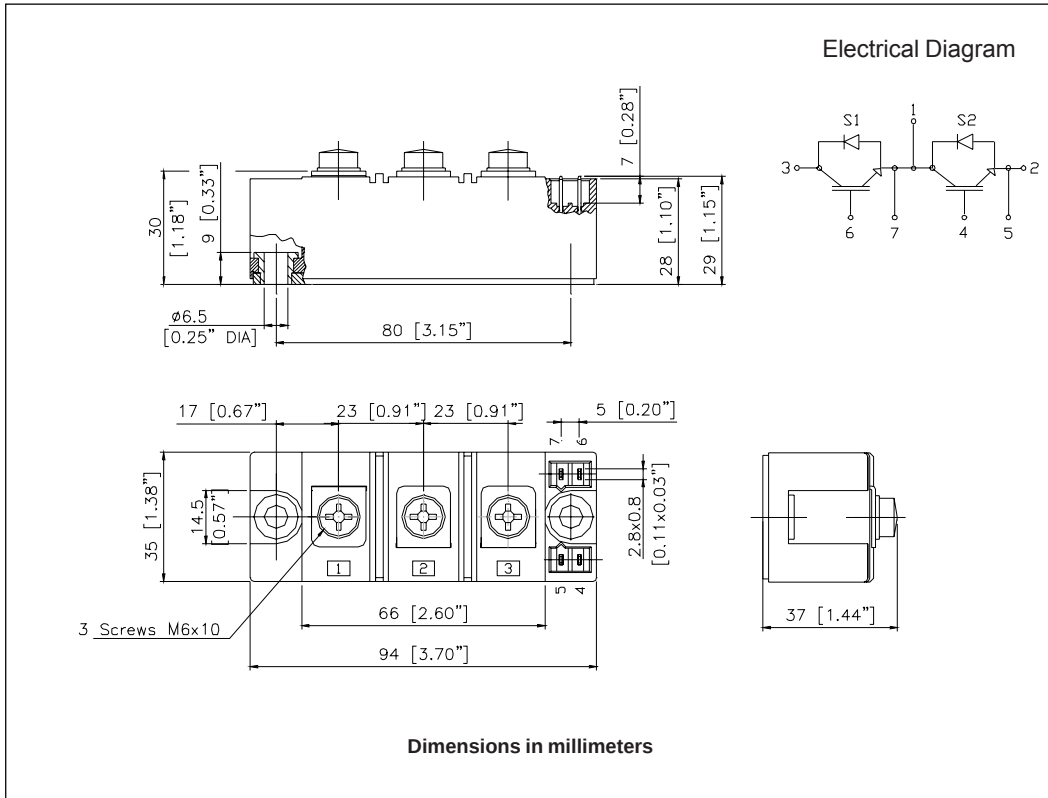


Figure 17. Pulsed Collector Current
Test Circuit

Outline Table



Data and specifications subject to change without notice.
This product has been designed and qualified for Industrial Level.
Qualification Standards can be found on IR's Web site.

International
IOR Rectifier

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