International
IOR Rectifier

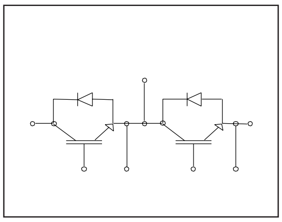
GA200TS60UX

"HALF-BRIDGE" IGBT INT-A-PAK

Ultra-Fast^{TM} 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^{TM} antiparallel diodes with ultra-soft recovery
- Industry standard package
- UL approved



V_{CES} = 600V

$V_{CE(on)}$ 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	Continuos Collector Current	@ T_C = 25°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 min		2500	
P_D	Maximum Power Dissipation	@ T_C = 25°C	625	W
		@ T_C = 85°C	325	

Electrical Characteristics @ T_J = 25°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°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/°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-Emiter Leakage Current		0.014	1	mA	V_{GE} = 0V, V_{CE} = 600V
				10		V_{GE} = 0V, V_{CE} = 600V, T_J = 125°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°C
I_{GES}	Gate-to-Emitter Leakage Current			± 250	nA	V_{GE} = ± 20V

Switching Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameters	Min	Typ	Max	Units	Test Conditions
Q_g	Total Gate Charge		900		nC	I_C = 200A
Q_{ge}	Gate-Emitter Charge		125			I_C = 270A, V_{GE} = 15V
Q_{gc}	Gate-Collector Charge		306			
$t_{d(on)}$	Turn-On Delay Time		342		ns	
t_r	Rise Time		194			I_C = 200A
$t_{d(off)}$	Turn-Off Delay Time		366			V_{CC} = 360V
t_f	Fall Time		213			V_{GE} = ± 15V
E_{on}	Turn-On Switching Energy		5		mJ	T_J = 125°C
E_{off}	Turn-Off Switching Energy		16			R_{G1} = 15Ω
E_{ts}	Total Switching Energy		21			R_{G2} = 0Ω
C_{ies}	Input Capacitance	—	20068	—	pF	V_{GE} = 0V
C_{oes}	Output Capacitance	—	1254	—		V_{CC} = 30V
C_{res}	Reverse Transfer Capacitance	—	261	—		f = 1 MHz
t_{rr}	Diode Reverse Recovery Time	—	179	—	ns	I_C = 200A
I_{rr}	Diode Peak Reverse Current	—	120	—	A	V_{CC} = 360V
Q_{rr}	Diode Recovery Charge	—	10714	—	µC	di/dt=1300A/µs
$di_{(rec)}M/dt$	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	°C
T_{STG}	Storage Temperature Range		- 40		125	
R_{thJC}	Junction-to-Case	IGBT			0.2	°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

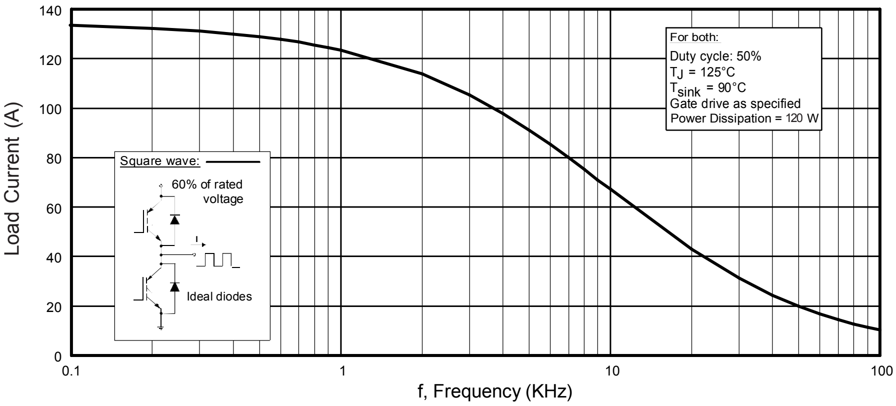


Fig. 1 - Typical Load Current vs. Frequency
(Load Current = I_{RMS} of fundamental)

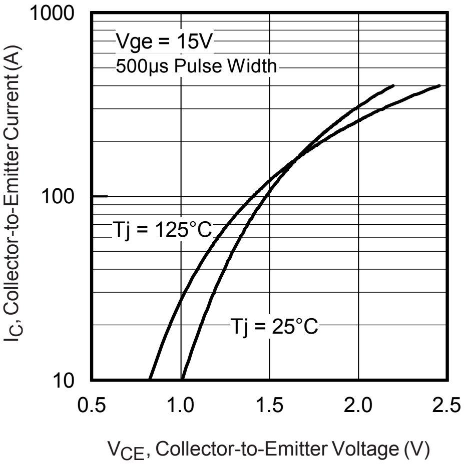


Fig. 2 - Typical Output Characteristics

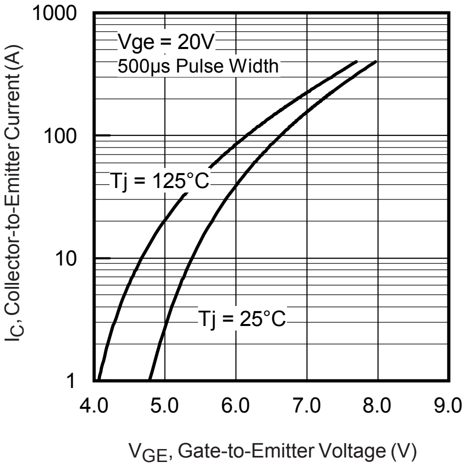


Fig. 3 - Typical Transfer Characteristics

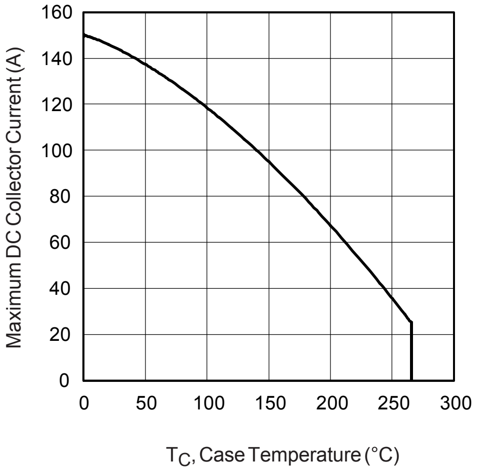


Fig. 4 - Maximum Collector Current vs. Case Temperature

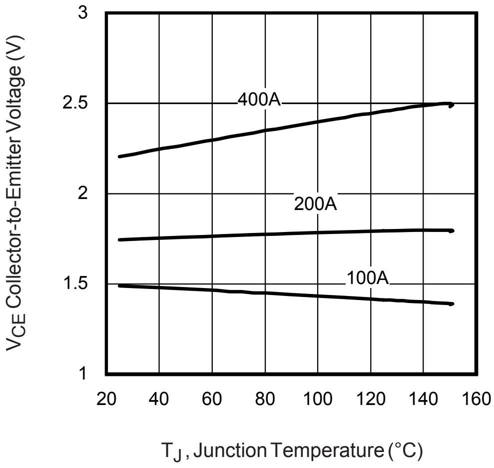


Fig. 5 - Typical Collector-to-Emitter Voltage vs. Junction Temperature

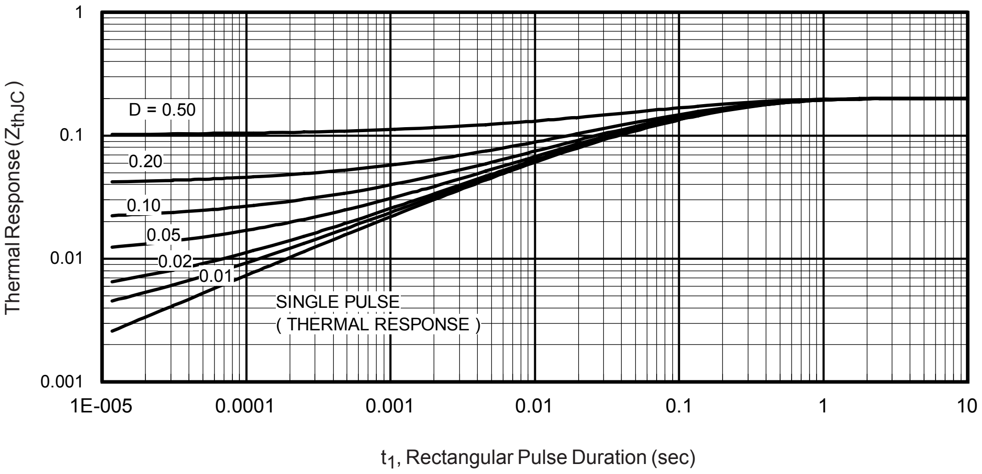


Fig. 6 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

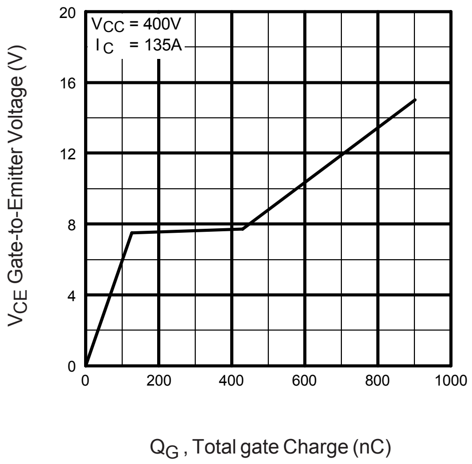


Fig. 7 - Typical Gate Charge vs. Gate-to-Emitter Voltage

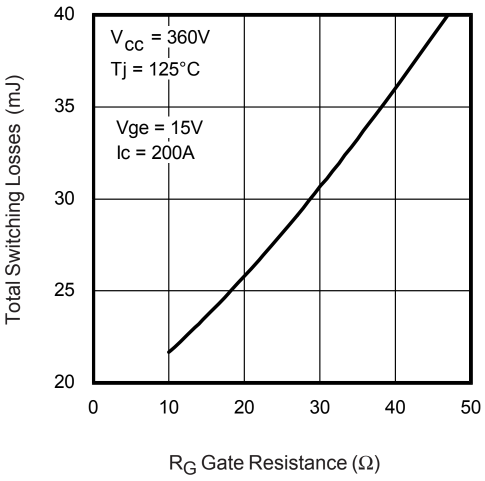


Fig. 8 - Typ. Switching Losses vs. Gate Resistance

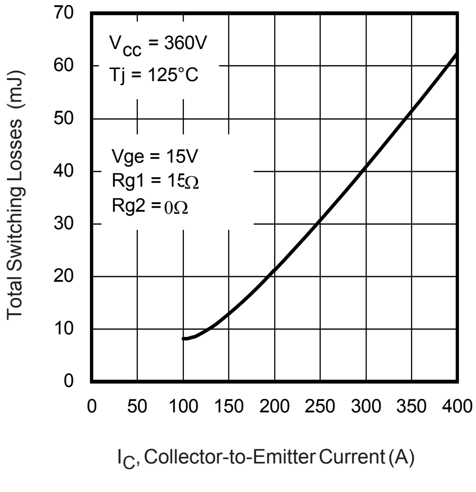


Fig. 9 - Typ. Switching Losses vs. Collector-to-Emitter Current

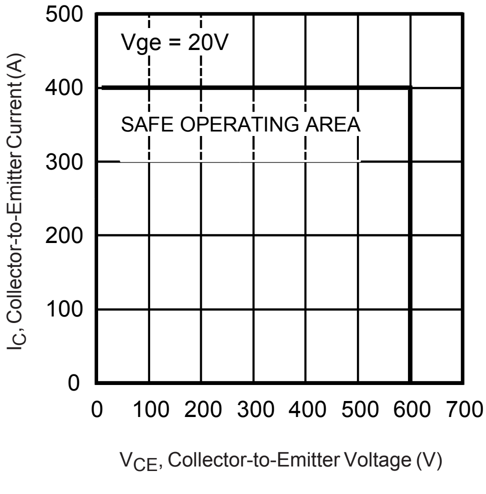


Fig. 10 - Reverse Bias SOA

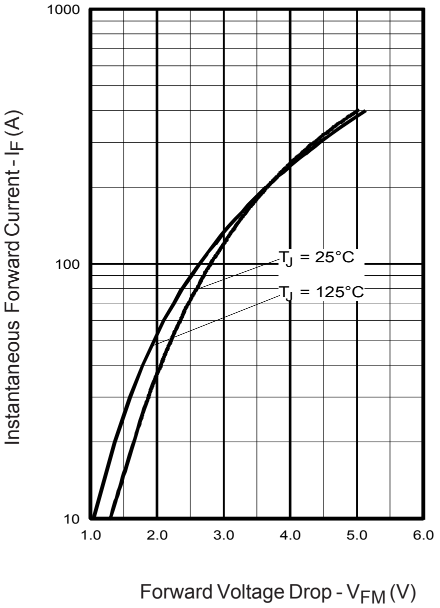


Fig. 11 - Typ. Forward Voltage Drop vs. Instantaneous Forward Current

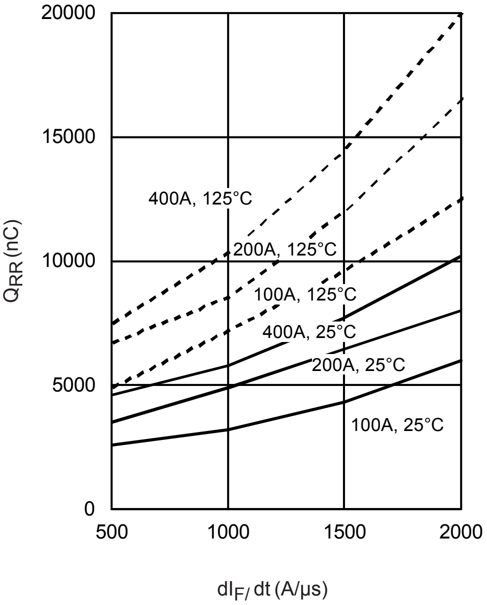


Fig. 12 - Typical Stored Charge vs. dI $_f$ / dt

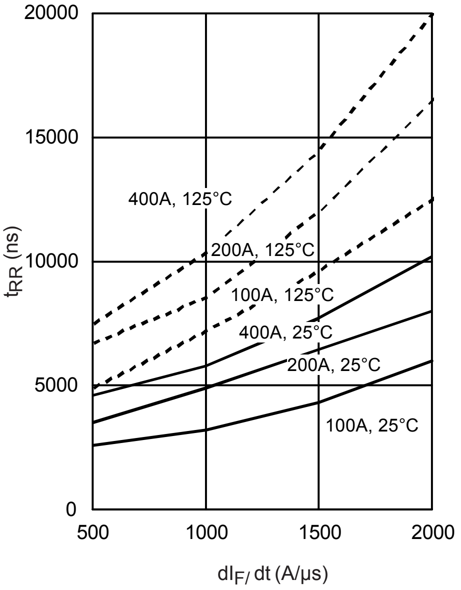


Fig. 13 - Typical Reverse Recovery vs. dI $_f$/dt

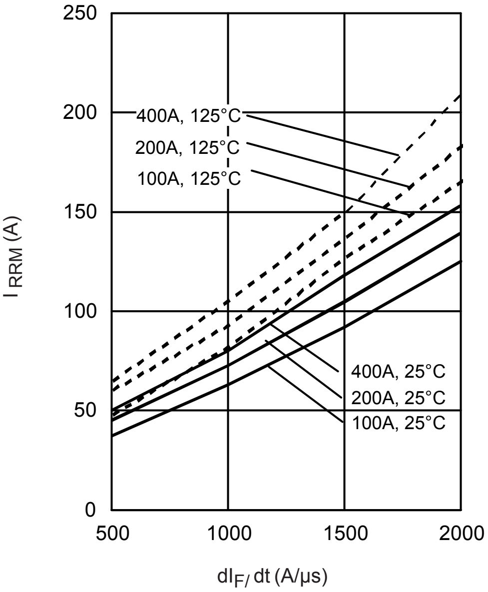


Fig. 14 - Typical Reverse Recovery vs. dI $_f$/dt

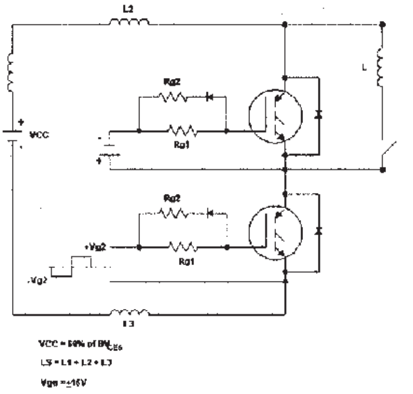


Fig. 15a - Test Circuit for Measurement of I_{LM}, E_{on}, $E_{off(diode)}$, t_{rr}, Q_{rr}, I_{rr}, $t_{d(on)}$, t_r, $t_{d(off)}$, t_f

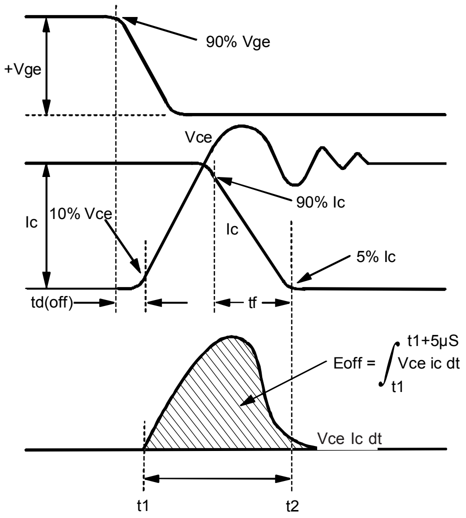


Fig. 15b - Test Waveforms for Circuit of Fig. 18a, Defining E_{off}, $t_{d(off)}$, t_f

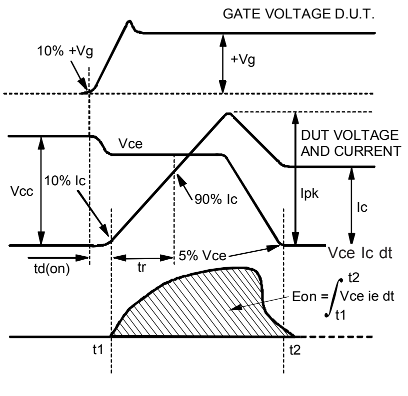


Fig. 15c - Test Waveforms for Circuit of Fig. 18a, Defining E_{on}, $t_{d(on)}$, t_r

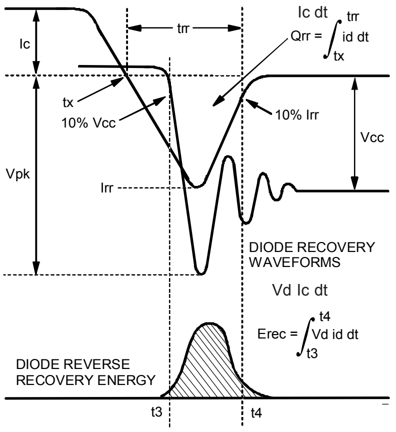


Fig. 15d - Test Waveforms for Circuit of Fig. 18a, Defining E_{rec}, t_{rr}, Q_{rr}, I_{rr}

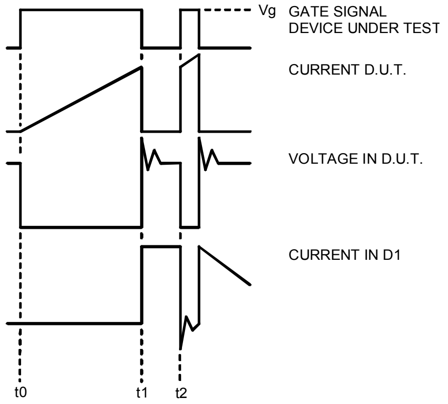


Figure 15e. Macro Waveforms for Figure 18a's Test Circuit

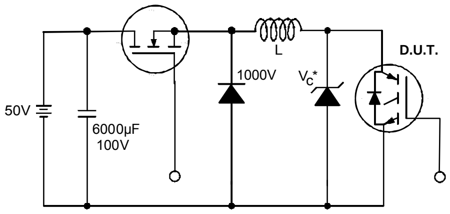


Figure 16. Clamped Inductive Load Test Circuit

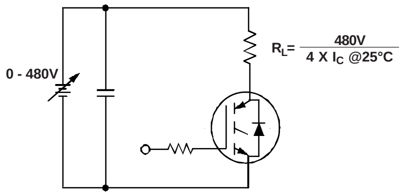
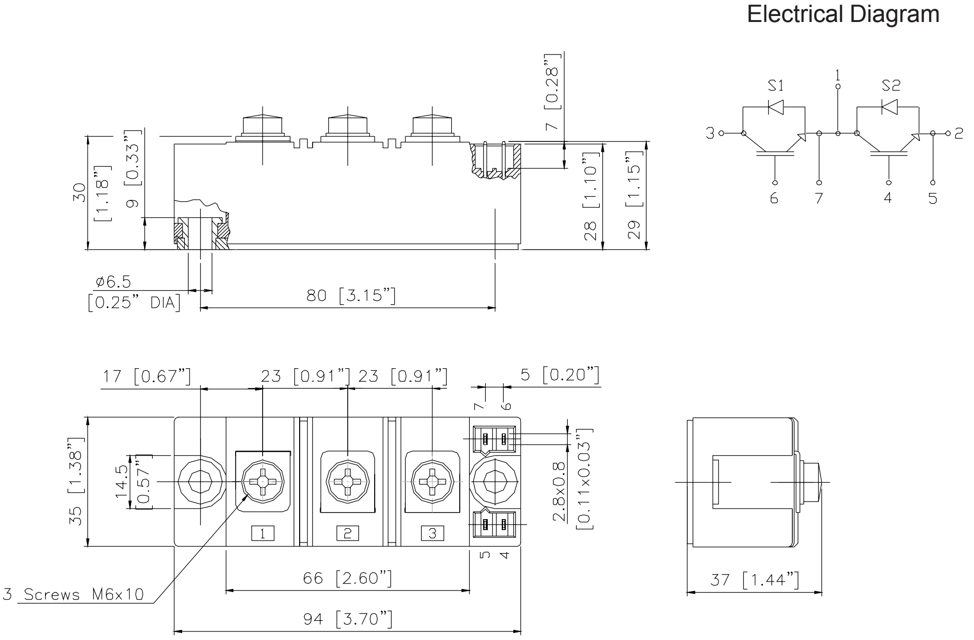


Figure 17. Pulsed Collector Current Test Circuit

Outline Table



Dimensions in millimeters

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
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