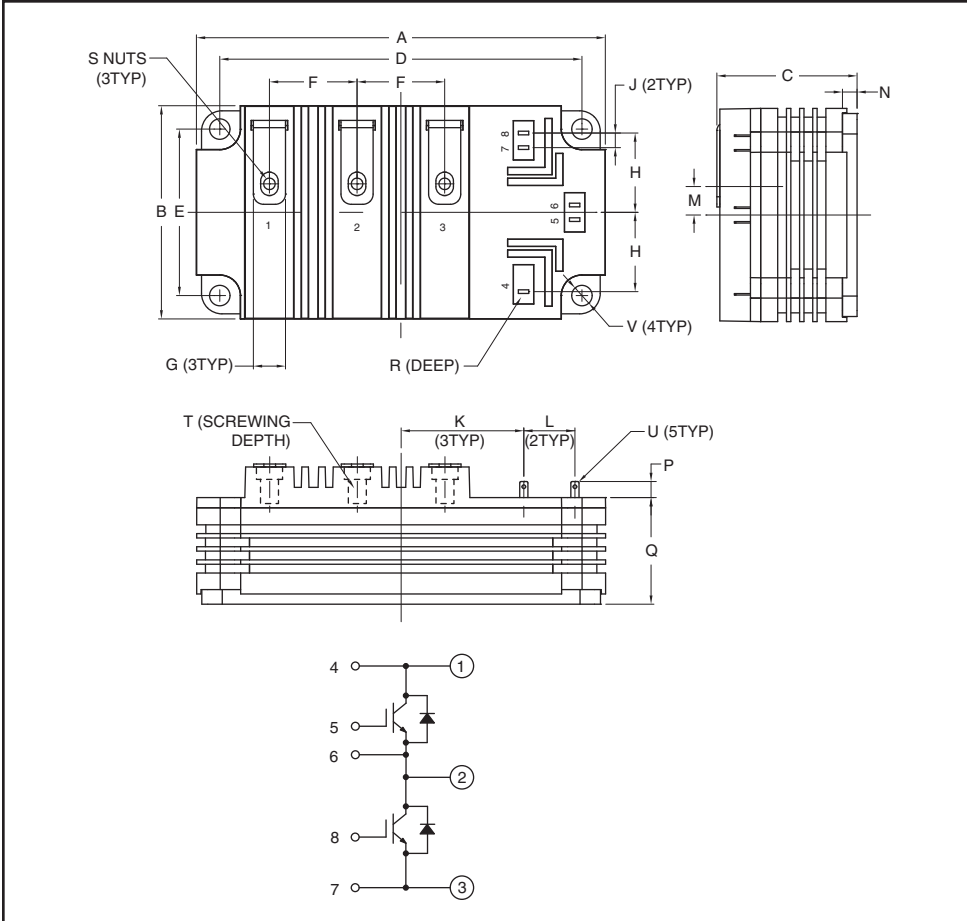


**Dual IGBT
 HVIGBT Module
 200 Amperes/3300 Volts**



Description:

Powerex IGBT Modules are designed for use in switching applications. Each module consists of two IGBT Transistors in a half-bridge configuration with each transistor having a super-fast recovery free-wheel diode. All components and interconnects are isolated from the heat sinking baseplate, offering simplified system assembly and thermal management.

Features:

- Advanced Mitsubishi R-Series Chip Technology
- Low $V_{CE(sat)}$
- Creepage and Clearance meet IEC 60077-1
- High Isolation Voltage
- Rugged SWSOA and RRSOA
- Compact Industry Standard Package

Applications:

- Medium Voltage Drives
- High Voltage Power Supplies

Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	5.51	140.0
B	2.87	73.0
C	1.89	48.0
D	4.88±0.01	124.0±0.25
E	2.24±0.01	57.0±0.25
F	1.18	30.0
G	0.43	11.0
H	1.07	27.15
J	0.20	5.0
K	1.65	42.0

Dimensions	Inches	Millimeters
L	0.69±0.01	17.5±0.25
M	0.38	9.75
N	0.20	5.0
P	0.22	5.5
Q	1.44	36.5
R	0.16	4.0
S	M6 Metric	M6
T	0.63 Min.	16.0 Min.
U	0.11 x 0.02	2.8 x 0.5
V	0.28 Dia.	7.0 Dia.

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

Ratings	Symbol	QID3320002	Units
Junction Temperature	T_j	-40 to 150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-40 to 125	$^\circ\text{C}$
Collector-Emitter Voltage ($V_{GE} = 0\text{V}$)	V_{CES}	3300	Volts
Gate-Emitter Voltage ($V_{CE} = 0\text{V}$)	V_{GES}	± 20	Volts
Collector Current ($T_C = 102^\circ\text{C}$)	I_C	200	Amperes
Collector Current ($T_C = 25^\circ\text{C}$)	I_C	370	Amperes
Peak Collector Current (Pulse)	I_{CM}	400*	Amperes
Diode Forward Current** ($T_C = 99^\circ\text{C}$)	I_F	200	Amperes
Diode Forward Surge Current** (Pulse)	I_{FM}	400*	Amperes
I^2t for Diode ($t = 10\text{ms}$, $V_R = 0\text{V}$, $T_j = 125^\circ\text{C}$)	I^2t	15	kA^2sec
Maximum Collector Dissipation ($T_C = 25^\circ\text{C}$, IGBT Part, $T_{j(max)} \leq 150^\circ\text{C}$)	P_C	1780	Watts
Mounting Torque, M6 Terminal Screws	—	44	in-lb
Mounting Torque, M6 Mounting Screws	—	44	in-lb
Module Weight (Typical)	—	900	Grams
Isolation Voltage (Charged Part to Baseplate, AC 60Hz 1 min.)	V_{iso}	7.7	kVolts
Partial Discharge ($V_1 = 4800\text{V}_{RMS}$, $V_2 = 3500\text{V}_{RMS}$, $f = 60\text{Hz}$ (Acc. to IEC 1287))	Q_{pd}	10	pC
Maximum Short-Circuit Pulse Width, ($V_{CC} \leq 2500\text{V}$, $V_{CE} \leq V_{CES}$, $V_{GE} = 15\text{V}$, $T_j = 125^\circ\text{C}$)	t_{psc}	10	μs

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector-Cutoff Current	I_{CES}	$V_{CE} = V_{CES}$, $V_{GE} = 0\text{V}$	—	—	2.0	mA
Gate Leakage Current	I_{GES}	$V_{GE} = V_{GES}$, $V_{CE} = 0\text{V}$	—	—	0.5	μA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$I_C = 15\text{mA}$, $V_{CE} = 10\text{V}$	5.5	6.0	6.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 200\text{A}$, $V_{GE} = 15\text{V}$, $T_j = 25^\circ\text{C}$	—	2.7***	3.3	Volts
		$I_C = 200\text{A}$, $V_{GE} = 15\text{V}$, $T_j = 125^\circ\text{C}$	—	3.4	4.0	Volts
		$I_C = 200\text{A}$, $V_{GE} = 15\text{V}$, $T_j = 150^\circ\text{C}$	—	3.6	—	Volts
Total Gate Charge	Q_G	$V_{CC} = 1800\text{V}$, $I_C = 170\text{A}$, $V_{GE} = 15\text{V}$	—	1.8	—	μC
Emitter-Collector Voltage**	V_{EC}	$I_E = 200\text{A}$, $V_{GE} = 0\text{V}$, $T_j = 25^\circ\text{C}$	—	2.3	3.0	Volts
		$I_E = 200\text{A}$, $V_{GE} = 0\text{V}$, $T_j = 125^\circ\text{C}$	—	2.45	—	Volts
		$I_E = 200\text{A}$, $V_{GE} = 0\text{V}$, $T_j = 150^\circ\text{C}$	—	2.55	—	Volts

* Pulse width and repetition rate should be such that device junction temperature (T_j) does not exceed $T_{j(max)}$ rating.

**Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWD).

*** Pulse width and repetition rate should be such that device junction temperature rise is negligible.

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance	C_{ies}		—	23	—	nF
Output Capacitance	C_{oes}	$V_{GE} = 0V, V_{CE} = 10V$	—	1.5	—	nF
Reverse Transfer Capacitance	C_{res}		—	0.7	—	nF
Turn-on Delay Time	$t_{d(on)}$	$V_{CC} = 1650V, I_C = 200A,$	—	800	—	ns
Rise Time	t_r	$V_{GE} = +15V/-8V,$	—	160	—	ns
Turn-off Delay Time	$t_{d(off)}$	$R_{G(on)} = 15\Omega, R_{G(off)} = 50\Omega,$	—	3200	—	ns
Fall Time	t_f	$L_S = 125nH, \text{ Inductive Load}$	—	1300	—	ns
Turn-on Switching Energy	E_{on}	$T_j = 125^\circ\text{C}, I_C = 200A, V_{GE} = +15V/-8V,$	—	335	—	mJ/P
Turn-off Switching Energy	E_{off}	$R_{G(on)} = 15\Omega, R_{G(off)} = 50\Omega,$ $V_{CC} = 1650V, L_S = 125nH, \text{ Inductive Load}$	—	275	—	mJ/P
Diode Reverse Recovery Time**	t_{rr}	$V_{CC} = 1650V, I_E = 200A,$	—	500	—	ns
Diode Reverse Recovery Charge**	Q_{rr}	$V_{GE} = +15V/-8V, R_{G(on)} = 15\Omega,$	—	180*	—	μC
Diode Reverse Recovery Energy	E_{rec}	$L_S = 125nH, \text{ Inductive Load}, T_j = 125^\circ\text{C}$	—	190	—	mJ/P
Stray Inductance (C1-E2)	L_{SCE}		—	60	—	nH
Lead Resistance Terminal-Chip	R_{CE}		—	0.8	—	m Ω

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case***	$R_{th(j-c)} Q$	Per IGBT	—	0.074	—	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case***	$R_{th(j-c)} D$	Per FWDi	—	0.11	—	$^\circ\text{C/W}$
Contact Thermal Resistance, Case to Fin	$R_{th(c-f)}$	Per Module, Thermal Grease Applied, $\lambda_{grease} = 1W/mK$	—	0.018	—	$^\circ\text{C/W}$
Comparative Tracking Index	CTI		600	—	—	
Clearance Distance in Air (Terminal to Base)	$d_{a(t-b)}$		35.0	—	—	mm
Creepage Distance Along Surface (Terminal to Base)	$d_{s(t-b)}$		64	—	—	mm
Clearance Distance in Air (Terminal to Terminal)	$d_{a(t-t)}$		19	—	—	mm
Creepage Distance Along Surface (Terminal to Terminal)	$d_{s(t-t)}$		54	—	—	mm

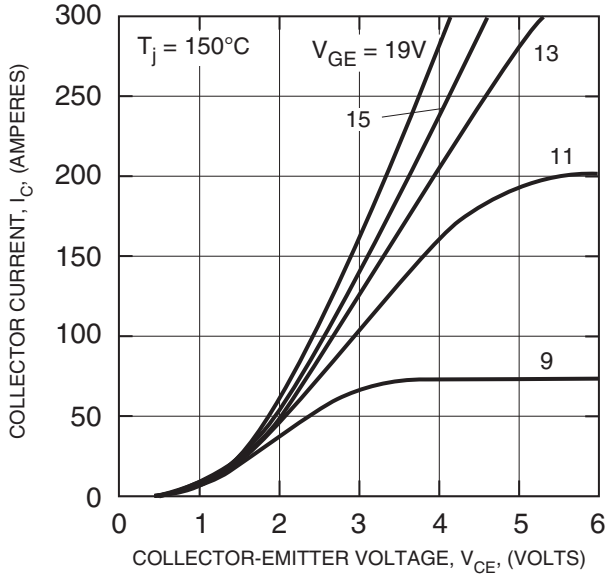
*Pulse width and repetition rate should be such that device junction temperature rise is negligible.

**Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

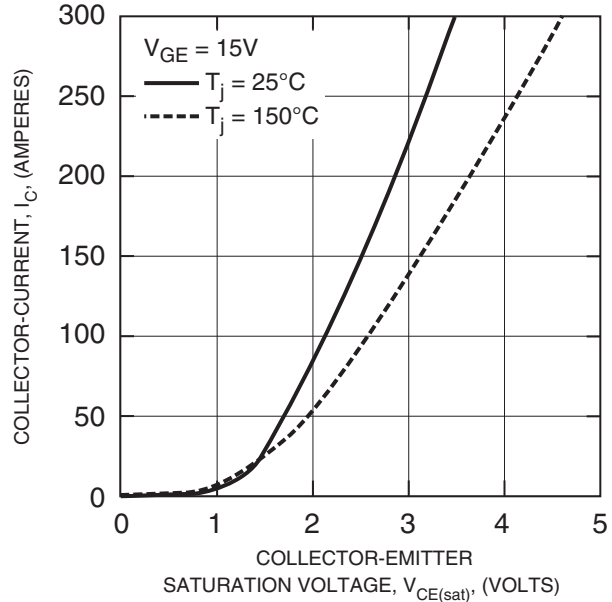
*** T_C measurement point is just under the chips.

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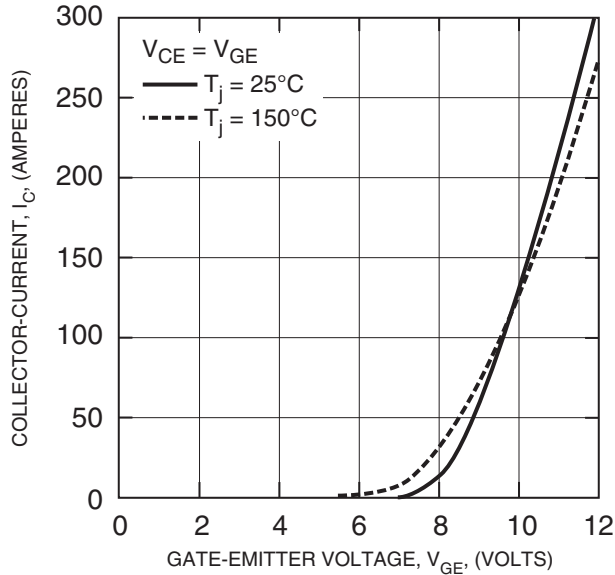
OUTPUT CHARACTERISTICS (TYPICAL)



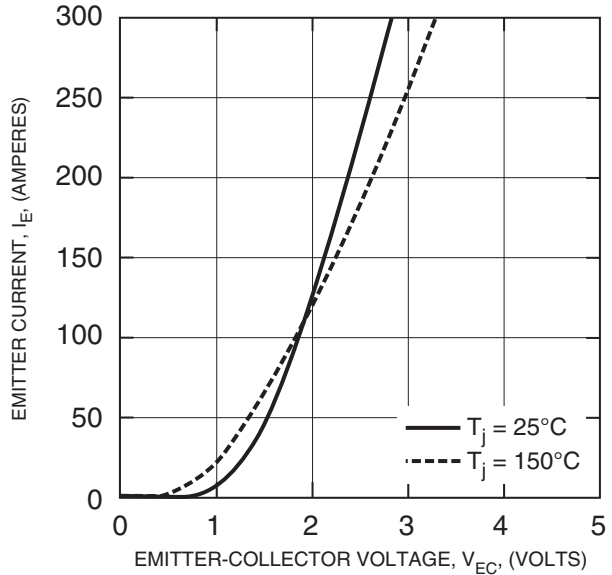
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



TRANSFER CHARACTERISTICS (TYPICAL)

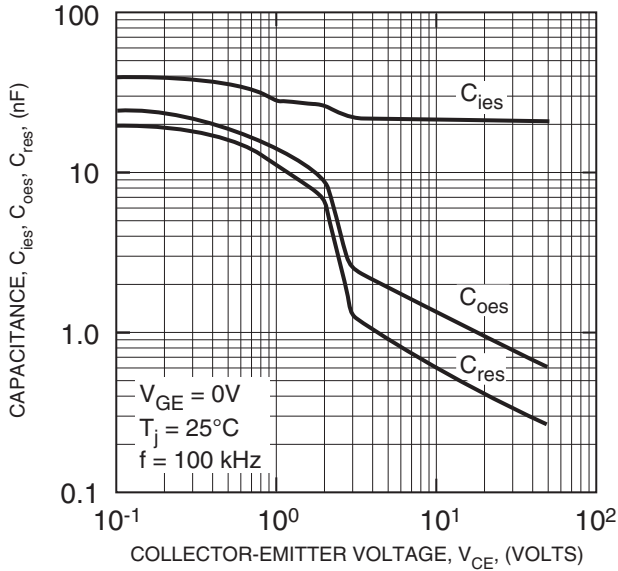


FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)

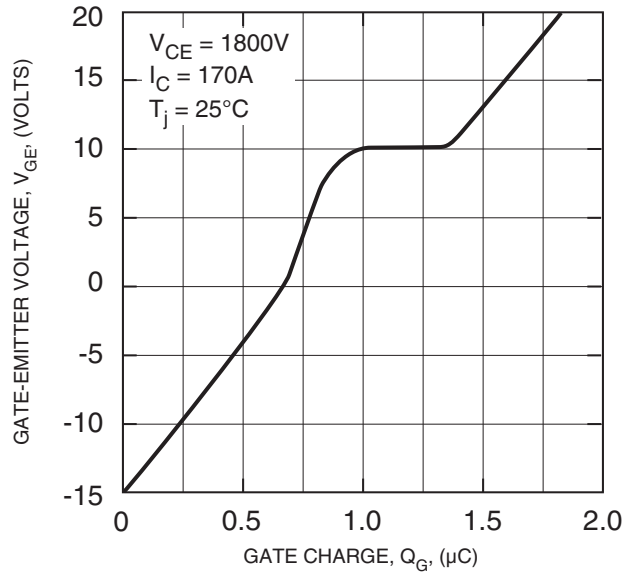


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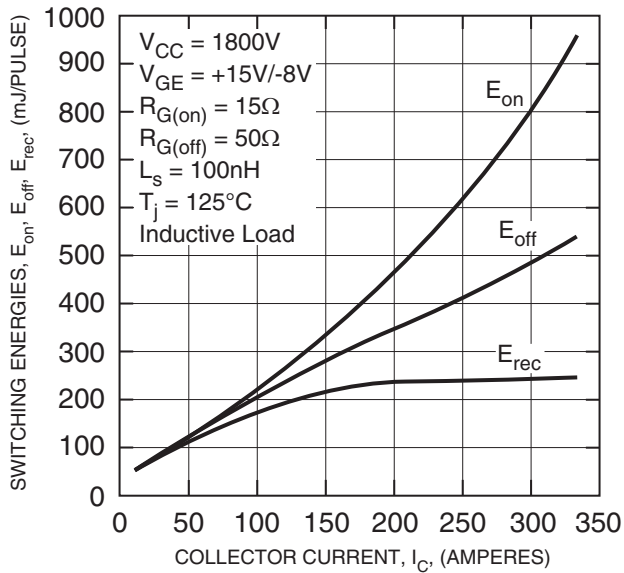
CAPACITANCE VS. V_{CE}
 (TYPICAL)



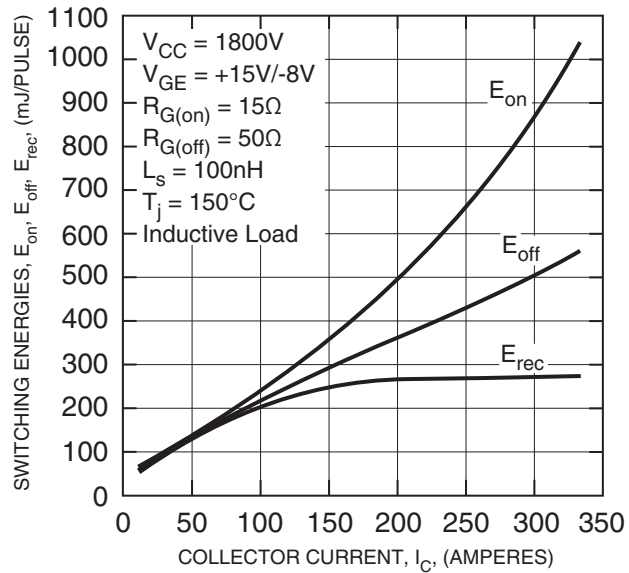
GATE CHARGE VS. V_{GE}



SWITCHING ENERGY CHARACTERISTICS (TYPICAL)

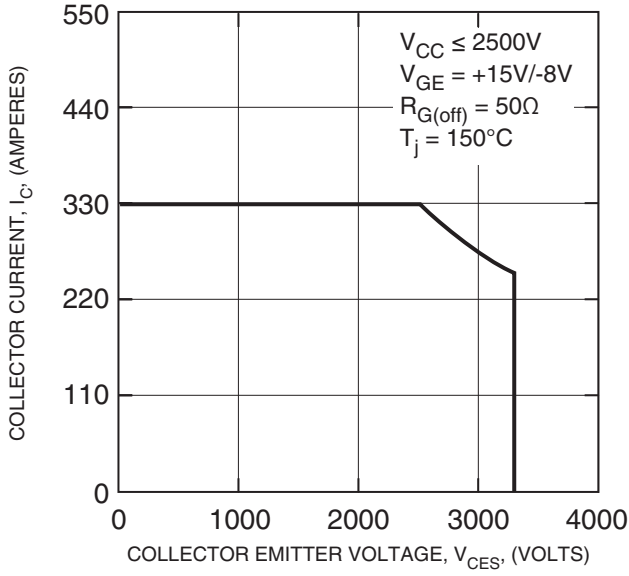


HALF-BRIDGE SWITCHING ENERGY CHARACTERISTICS (TYPICAL)

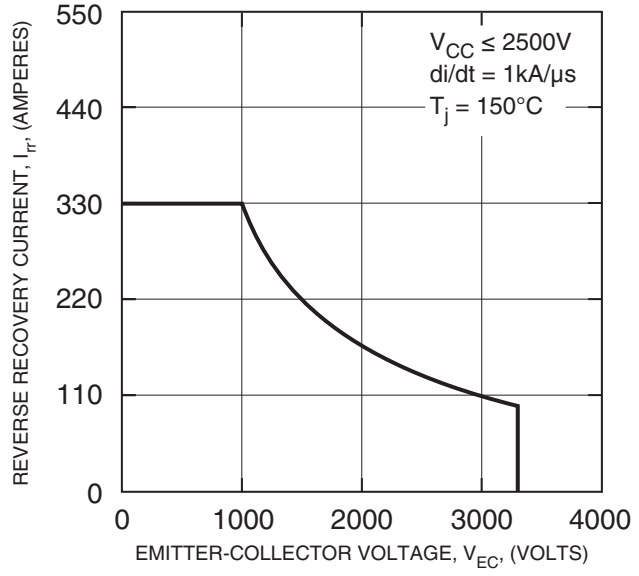


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REVERSE BIAS SAFE OPERATING AREA (TYPICAL)



FREE-WHEEL DIODE REVERSE RECOVERY SAFE OPERATING AREA (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDi)

