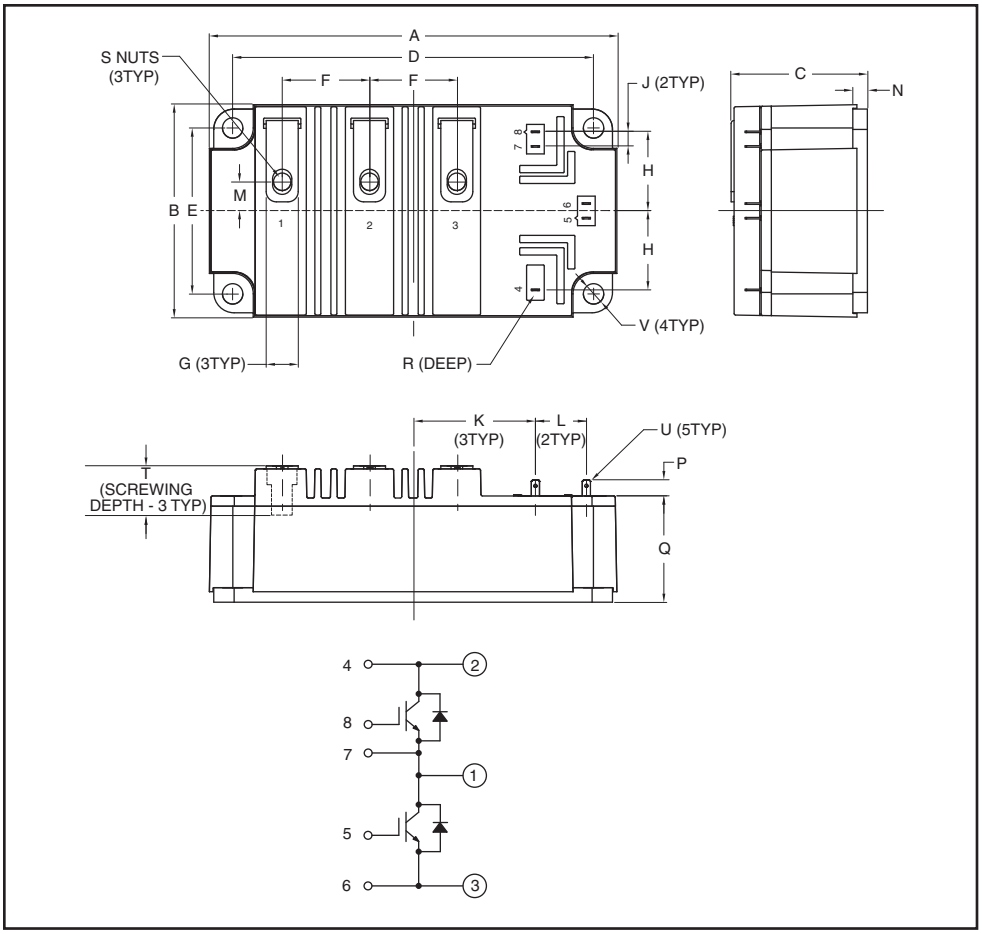
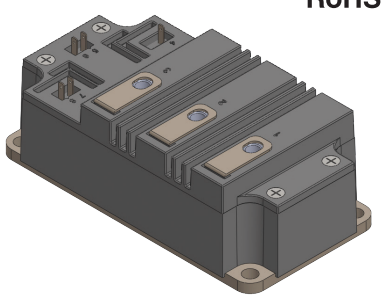
Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272
www.pwrx.com

Dual IGBT HVIGBT Module
200 Amperes/3300 Volts





Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	5.51	140.0
B	2.87	73.0
C	1.50	38.0
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	1.04	26.5
R	0.16	4.0
S	M5 Metric	M5
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.

Description:

Powerex HVIGBTs feature highly insulating housings that offer enhanced protection by means of greater creepage and strike clearance distance for many demanding applications like medium voltage drives and auxiliary traction applications.

Features:

- ☐ -40 to 150°C Extended Temperature Range
- ☐ 100% Dynamic Tested
- ☐ 100% Partial Discharge Tested
- ☐ Advanced Mitsubishi R-Series Chip Technology
- ☐ Aluminum Nitride (AIN) Ceramic Substrate for Low Thermal Impedance
- ☐ Complementary Line-up in Expanding Current Ranges to Mitsubishi HVIGBT Power Modules
- ☐ Copper Baseplate
- ☐ Creepage and Clearance Meet IEC 60077-1
- ☐ Rugged SWSOA and RRSOA
- ☐ UL Recognized (E78240)

Applications:

- ☐ High Voltage Power Supplies
- ☐ Medium Voltage Drives
- ☐ Motor Drives
- ☐ Traction

QID3320004
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Absolute Maximum Ratings, T_j = 25 °C unless otherwise specified

Ratings	Symbol	QID3320004	Units
Junction Temperature	T_j	-50 to +150	°C
Operating Temperature	T_{op}	-50 to +150	°C
Storage Temperature	T_{stg}	-55 to +150	°C
Collector-Emitter Voltage (V_{GE} = 0V)	V_{CES}	3300	Volts
Gate-Emitter Voltage (V_{CE} = 0V)	V_{GES}	±20	Volts
Collector Current (T_C = 102°C)	I_C	200	Amperes
Collector Current (T_C = 25°C)	I_C	370	Amperes
Peak Collector Current (Pulse)	I_{CM}	400*	Amperes
Diode Forward Current** (T_C = 99°C)	I_F	200	Amperes
Diode Forward Surge Current** (Pulse)	I_{FM}	400*	Amperes
I^2t for Diode (t = 10ms, V_R = 0V, T_j = 125°C)	I^2t	15	kA^2sec
Maximum Collector Dissipation (T_C = 25°C, IGBT Part, $T_{j(max)} \leq$ 150°C)	P_C	2080	Watts
Mounting Torque, M5 Terminal Screws	—	35	in-lb
Mounting Torque, M6 Mounting Screws	—	44	in-lb
Module Weight (Typical)	—	800	Grams
Isolation Voltage (Charged Part to Baseplate, AC 60Hz 1 min.)	V_{iso}	6.0	kVolts
Partial Discharge ($V1 = 3500\ V_{RMS}$, $V2 = 2600\ V_{RMS}$, f = 60Hz (Acc. to IEC 1287))	Q_{pd}	10	pC
Maximum Short-Circuit Pulse Width, ($V_{CC} \leq 2500V$, $V_{CE} \leq V_{CES}$, V_{GE} = 15V, T_j = 125°C)	t_{psc}	10	µs

Electrical Characteristics, T_j = 25 °C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector-Cutoff Current	I_{CES}	$V_{CE} = V_{CES}$, V_{GE} = 0V	—	—	2.0	mA
Gate Leakage Current	I_{GES}	$V_{GE} = V_{GES}$, V_{CE} = 0V	—	—	0.5	µA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	I_C = 15mA, V_{CE} = 10V	5.5	6.0	6.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 200A, V_{GE} = 15V, T_j = 25°C	—	2.7***	3.0	Volts
		I_C = 200A, V_{GE} = 15V, T_j = 125°C	—	3.4	4.0	Volts
		I_C = 200A, V_{GE} = 15V, T_j = 150°C	—	3.6	—	Volts
Total Gate Charge	Q_G	V_{CC} = 1800V, I_C = 170A, V_{GE} = 15V	—	1.8	—	µC
Emitter-Collector Voltage**	V_{EC}	I_E = 200A, V_{GE} = 0V, T_j = 25°C	—	2.3	3.0	Volts
		I_E = 200A, V_{GE} = 0V, T_j = 125°C	—	2.45	—	Volts
		I_E = 200A, V_{GE} = 0V, T_j = 150°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 (FWDi).
*** Pulse width and repetition rate should be such that device junction temperature rise is negligible.

QID3320004
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Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance	C_{ies}	V_{GE} = 0V, V_{CE} = 10V	—	23	—	nF
Output Capacitance	C_{oes}		—	1.5	—	nF
Reverse Transfer Capacitance	C_{res}		—	0.7	—	nF
Turn-on Delay Time	$t_{d(on)}$	V_{CC} = 1800V, I_C = 200A,	—	800	—	ns
Rise Time	t_r	V_{GE} = ±15V,	—	160	—	ns
Turn-off Delay Time	$t_{d(off)}$	$R_{G(on)}$ = 15Ω, $R_{G(off)}$ = 50Ω,	—	3200	—	ns
Fall Time	t_f	L_S = 100nH, Inductive Load	—	1300	—	ns
Turn-on Switching Energy	E_{on}	T_j = 150°C, I_C = 200A, V_{GE} = ±15V,	—	495	—	mJ/P
Turn-off Switching Energy	E_{off}	$R_{G(on)}$ = 15Ω, $R_{G(off)}$ = 50Ω,	—	360	—	mJ/P
		V_{CC} = 1800V, L_S = 100nH, Inductive Load				
Diode Reverse Recovery Time**	t_{rr}	V_{CC} = 1800V, I_E = 200A,	—	500	—	ns
Diode Reverse Recovery Charge**	Q_{rr}	V_{GE} = ±15V, $R_{G(on)}$ = 15Ω,	—	180*	—	µC
Diode Reverse Recovery Energy	E_{rec}	L_S = 100nH, Inductive Load, T_j = 150°C	—	265	—	mJ/P
Stray Inductance (C1-E2)	L_{SCE}		—	60	—	nH
Lead Resistance Terminal-Chip	R_{CE}		—	0.8	—	mΩ

Thermal and Mechanical Characteristics, T_j = 25 °C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case***	$R_{th(j-c)}$ Q	Per IGBT	—	0.060	—	°C/W
Thermal Resistance, Junction to Case***	$R_{th(j-c)}$ D	Per FWDi	—	0.096	—	°C/W
Contact Thermal Resistance, Case to Fin	$R_{th(c-f)}$	Per Module,	—	0.018	—	°C/W
		Thermal Grease Applied, λ_{grease} = 1W/mK				
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.

QID3320004
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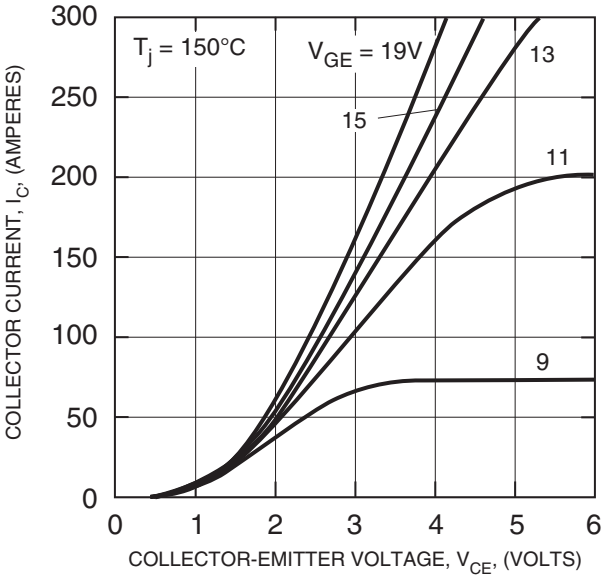
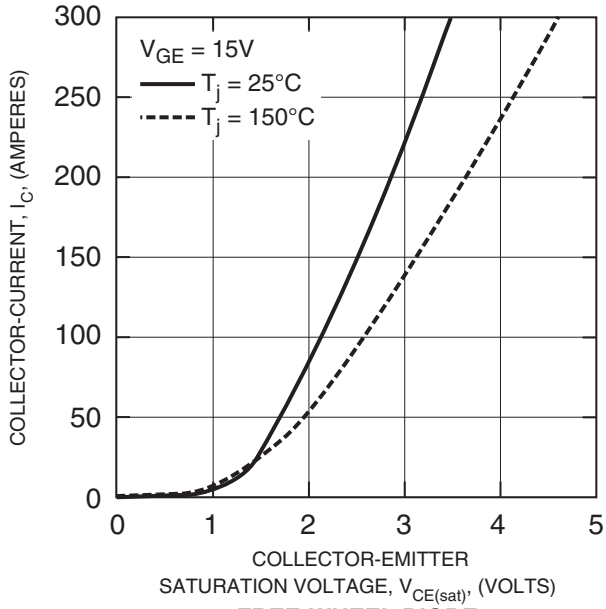
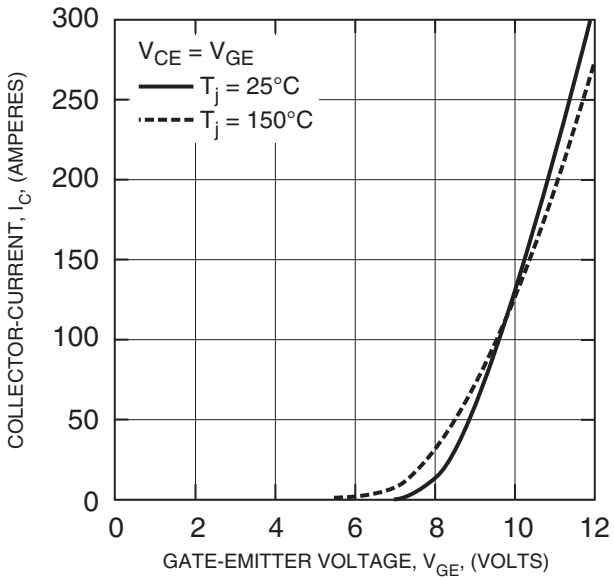
OUTPUT CHARACTERISTICS (TYPICAL)



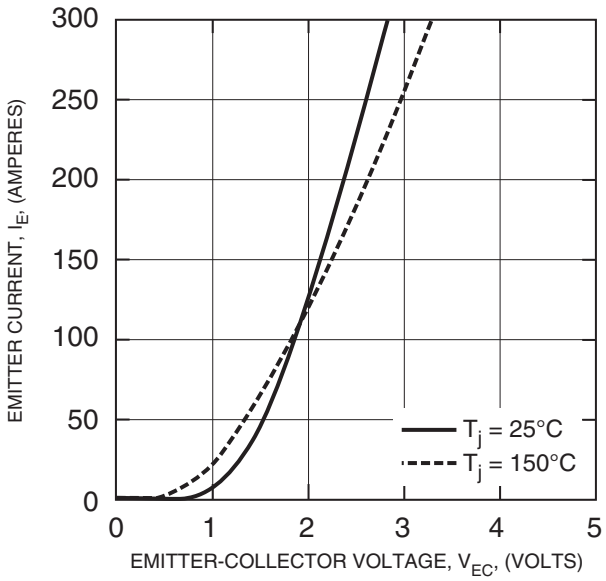
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



TRANSFER CHARACTERISTICS (TYPICAL)

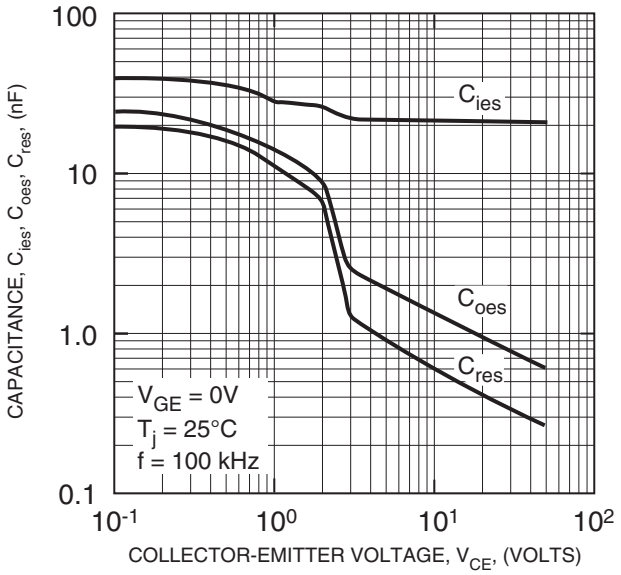


FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)

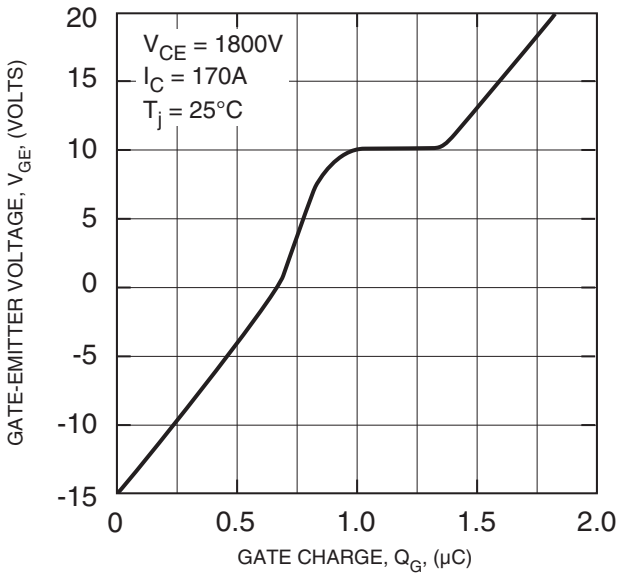


QID3320004
Dual IGBT HVIGBT Module
200 Amperes/3300 Volts

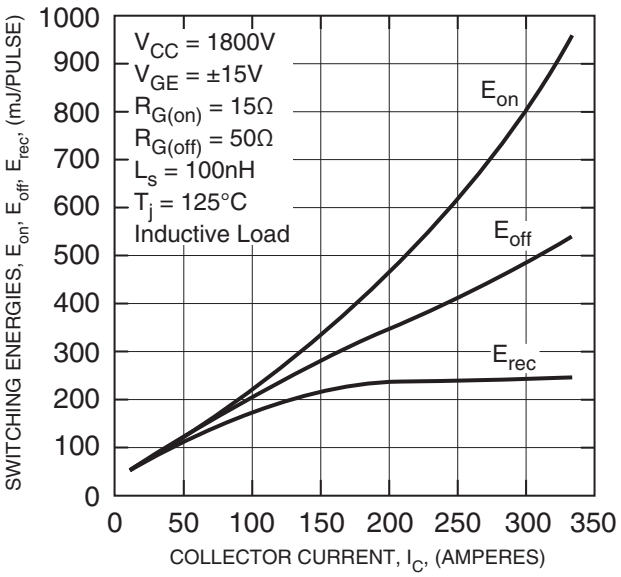
CAPACITANCE VS. V_{CE} (TYPICAL)



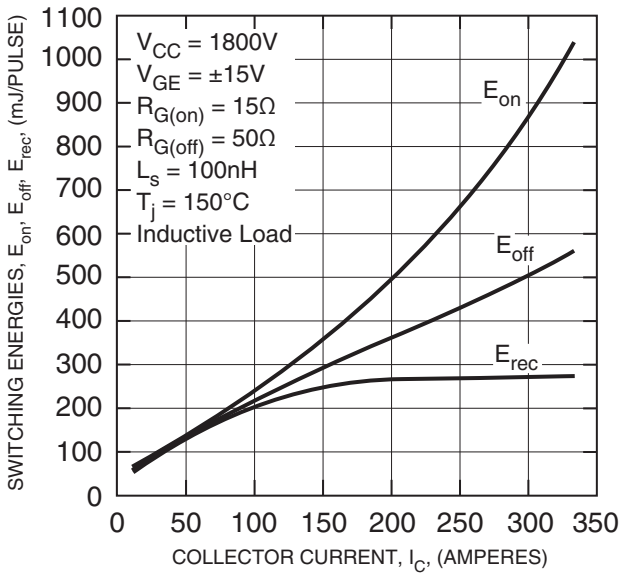
GATE CHARGE VS. V_{GE}



SWITCHING ENERGY CHARACTERISTICS (TYPICAL)



HALF-BRIDGE SWITCHING ENERGY CHARACTERISTICS (TYPICAL)



QID3320004
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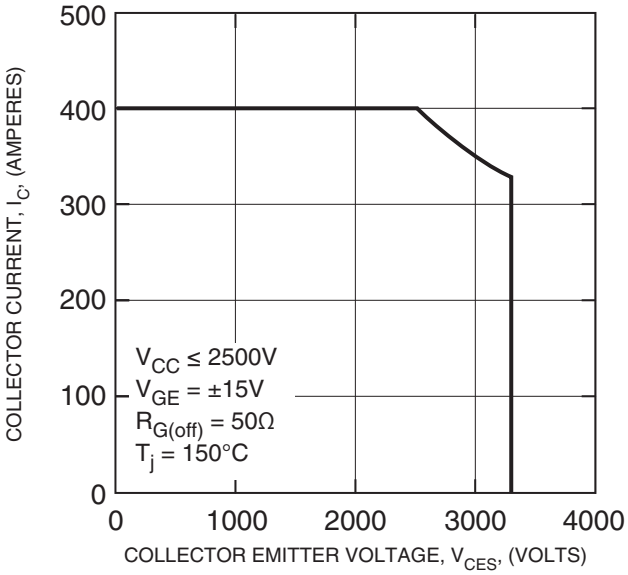
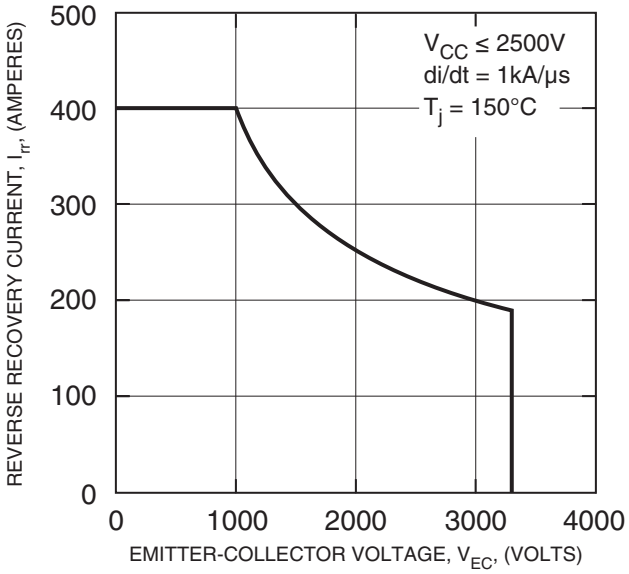
REVERSE BIAS SAFE OPERATING AREA (TYPICAL)



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



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT & FWDi)