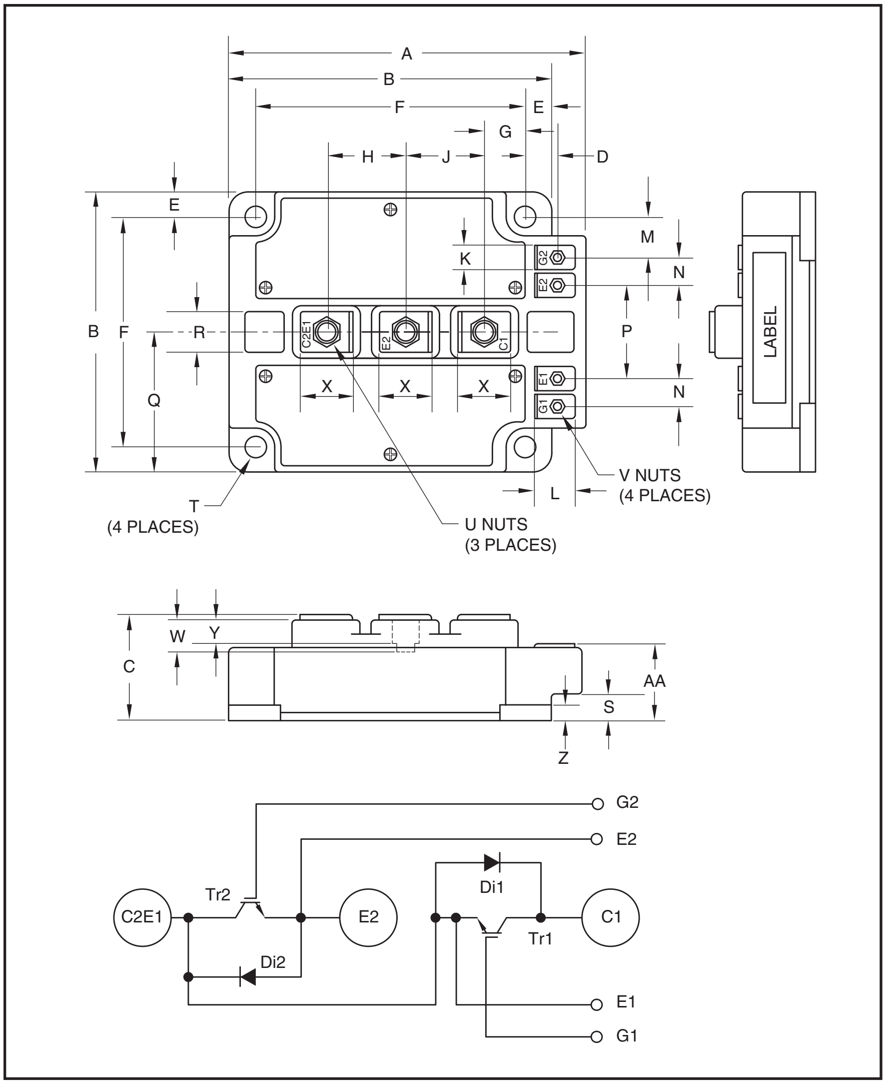
Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272
www.pwrx.com

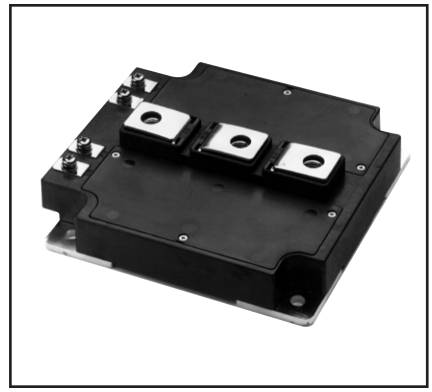
Dual IGBTMOD™ S-Series Module
800 Amperes/1200 Volts



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	5.51	140.0
B	5.12	130.0
C	1.38+0.04/-0.02	35.0+1.0/-0.5
D	0.45	11.5
E	0.39	10.0
F	4.33±0.001	110.0±0.25
G	0.54	13.8
H	1.42	36.0
J	1.72	43.8
K	0.35	9.0
L	0.59	15.0
M	0.80	20.4
N	0.57	14.5

Dimensions	Inches	Millimeters
P	1.57	40.0
Q	2.56	65.0
R	0.79	20.0
S	0.32	8.0
T	0.26 Dia.	6.5 Dia.
U	M8 Metric	M8
V	M4 Metric	M4
W	0.43	11.1
X	1.02	26.0
Y	0.29	7.3
Z	0.16	4.0
AA	0.96+0.04/-0.02	24.5+1.0/-0.5



Description:
Powerex Dual IGBTMOD™ 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 reverse-connected 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:
- ☐ Low Drive Power
- ☐ Low $V_{CE(sat)}$
- ☐ Discrete Super-Fast Recovery Free-Wheel Diode
- ☐ Isolated Baseplate for Easy Heat Sinking

Applications:
- ☐ AC Motor Control
- ☐ Motion/Servo Control
- ☐ UPS
- ☐ Welding Power Supplies
- ☐ Laser Power Supplies

Ordering Information:
Example: Select the complete module number you desire from the table - i.e. CM800DY-24S is a 1200V (V_{CES}), 800 Ampere Dual IGBTMOD™ Power Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	800	24

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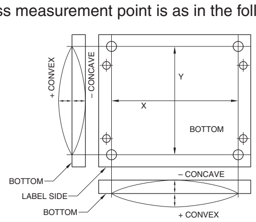
Absolute Maximum Ratings, T_j = 25 °C unless otherwise specified

Ratings	Symbol	CM800DY-24S	Units
Maximum Junction Temperature	$T_{j(max)}$	+175	°C
Operating Junction Temperature	$T_{j(op)}$	-40 ~ +150	°C
Storage Temperature	T_{stg}	-40 ~ +125	°C
Case Temperature*2	T_C	-40 ~ +125	°C
Collector-Emitter Voltage (G-E SHORT)	V_{CES}	1200	Volts
Gate-Emitter Voltage (C-E SHORT)	V_{GES}	±20	Volts
Collector Current (DC, T_c = 117°C)*2,*8	I_C	790	Amperes
Peak Collector Current (Pulse, Repetitive)*3	I_{CRM}	1600	Amperes
Total Power Dissipation (T_c = 25°C)*2,*4	P_{tot}	5355	Watts
Emitter Current (FWDi Current, T_c = 25°C)*2,*4,*8	I_E*1	790	Amperes
Peak Emitter Current (FWDi Current, Pulse, Repetitive)*3	I_{ERM}*1	1600	Amperes
Mounting Torque, M8 Main Terminals	–	95	in-lb
Mounting Torque, M4 Auxiliary Terminals	–	15	in-lb
Mounting Torque, M6 Mounting to Heatsink	–	40	in-lb
Creepage Distance (Terminal to Terminal)	d_s	–	mm
Creepage Distance (Terminal to Baseplate)	d_s	–	mm
Clearance (Terminal to Terminal)	d_a	–	mm
Clearance (Terminal to Baseplate)	d_a	–	mm
Weight	–	1200	Grams
Flatness of Baseplate (On the Centerline X, Y)*7	e_c	-100 ~ +100	µm
Isolation Voltage (Terminals to Baseplate, RMS, f = 60Hz, AC 1 min.)	V_{iso}	2500	Volts

*1 Represent ratings and characteristics of the anti-parallel, emitter-to-collector free wheeling diode (FWDi).
*2 Case temperature (T_C) and heatsink temperature (T_s) measured point is just under the chips.
*3 Pulse width and repetition rate should be such that device junction temperature (T_j) does not exceed $T_{j(max)}$ rating.
*4 Junction temperature (T_j) should not increase beyond maximum junction temperature ($T_{j(max)}$) rating.
*6 Typical value is measured by using thermally conductive grease of λ = 0.9 W/(m•K).
*7 Baseplate flatness measurement point is as in the following figure.



*8 This module has 800A IGBT and FWDi chips. This limitation is based on a package limitation.

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Static Electrical Characteristics, T_j = 25 °C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector-Emitter Cutoff Current	I_{CES}	$V_{CE} = V_{CES}$, V_{GE} = 0V	–	–	1	mA
Gate-Emitter Leakage Current	I_{GES}	$V_{GE} = V_{GES}$, V_{CE} = 0V	–	–	0.5	µA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	I_C = 80mA, V_{CE} = 10V	5.4	6.0	6.6	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$ (Terminal)	I_C = 800A, V_{GE} = 15V, T_j = 25°C*5	–	1.95	2.40	Volts
		I_C = 800A, V_{GE} = 15V, T_j = 125°C*5	–	2.25	–	Volts
		I_C = 800A, V_{GE} = 15V, T_j = 150°C*5	–	2.35	–	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$ (Chip)	I_C = 800A, V_{GE} = 15V, T_j = 25°C	–	1.70	2.15	Volts
		I_C = 800A, V_{GE} = 15V, T_j = 125°C	–	1.90	–	Volts
		I_C = 800A, V_{GE} = 15V, T_j = 150°C	–	1.95	–	Volts
Gate Charge	Q_G	V_{CC} = 600V, I_C = 800A, V_{GE} = 15V	–	1868	–	nC
Emitter-Collector Voltage	V_{EC}*1 (Terminal)	I_E = 800A, V_{GE} = 0V, T_j = 25°C*5	–	1.85	2.30	Volts
		I_E = 800A, V_{GE} = 0V, T_j = 125°C*5	–	1.85	–	Volts
		I_E = 800A, V_{GE} = 0V, T_j = 150°C*5	–	1.85	–	Volts
Emitter-Collector Voltage	V_{EC}*1 (Chip)	I_E = 800A, V_{GE} = 0V, T_j = 25°C	–	1.70	2.15	Volts
		I_E = 800A, V_{GE} = 0V, T_j = 125°C	–	1.70	–	Volts
		I_E = 800A, V_{GE} = 0V, T_j = 150°C	–	1.70	–	Volts

Dynamic Electrical Characteristics, T_j = 25 °C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance	C_{ies}	V_{CE} = 10V, V_{GE} = 0V	–	–	80.0	nF
Output Capacitance	C_{oes}		–	–	16.0	nF
Reverse Transfer Capacitance	C_{res}		–	–	1.32	nF
Turn-on Delay Time	$t_{d(on)}$	V_{CC} = 600V, I_C = 800A,	–	–	800	ns
Rise Time	t_r	V_{GE} = 15V,	–	–	200	ns
Turn-off Delay Time	$t_{d(off)}$	R_G = 0Ω,	–	–	600	ns
Fall Time	t_f	Inductive Load	–	–	300	ns
Reverse Recovery Time	t_{rr}*1	V_{CC} = 600V, I_E = 800A, V_{GE} = ±15V,	–	–	300	ns
Reverse Recovery Charge	Q_{rr}*1	R_G = 0Ω, Inductive Load	–	42.8	–	µC
Turn-on switching Energy (Per Pulse)	E_{on}	V_{CC} = 600V, $I_C = I_E$ = 800A,	–	107	–	mJ
Turn-off Switching Energy (Per Pulse)	E_{off}	V_{GE} = ±15V, R_G = 0Ω,	–	82	–	mJ
Reverse Recovery Energy (Per Pulse)	E_{rr}*1	T_j = 150°C, Inductive Load	–	71	–	mJ
Internal Lead resistance	$R_{CC' + EE'}$	Main Terminals-Chip, Per Switch, T_C = 25°C*2	–	–	0.4	mΩ
Internal Gate Resistance	r_g	Per Switch	–	2.45	–	Ω

*1 Represent ratings and characteristics of the anti-parallel, emitter-to-collector free wheeling diode (FWDi).
*2 Case temperature (T_C) and heatsink temperature (T_s) measured point is just under the chips.
*5 Pulse width and repetition rate should be such as to cause negligible temperature rise.

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case*2	$R_{th(j-c)}Q$	Per IGBT	–	–	0.028	°C/W
Thermal Resistance, Junction to Case*2	$R_{th(j-c)}R$	Per FWDi	–	–	0.045	°C/W
Contact Thermal Resistance*2	$R_{th(c-s)}$	Case to Heatsink, Per 1/2 Module, Thermal Grease Applied*6	–	0.015	–	°C/W

Recommended Operating Conditions, T_a = 25 °C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
DC Supply Voltage	V_{CC}	Applied Across C1-E2	–	600	850	Volts
Gate (-Emitter Drive) Voltage	$V_{GE(on)}$	Applied Across G1-Es1/G2-Es2	13.5	15.0	16.5	Volts
External Gate Resistance	R_G	Per Switch	0	–	5.1	Ω

*2 Case temperature (T_C) and heatsink temperature (T_s) measured point is just under the chips.
*6 Typical value is measured by using thermally conductive grease of λ = 0.9 W/(m•K).

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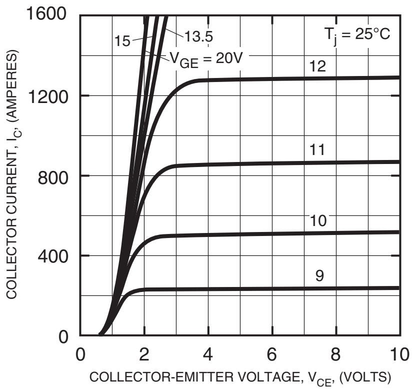
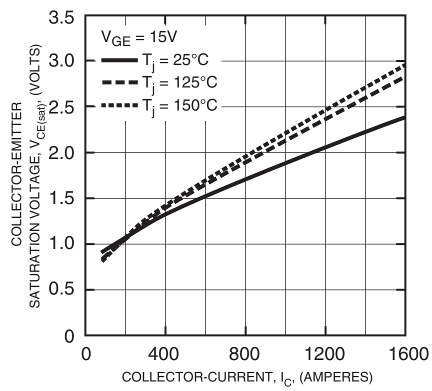
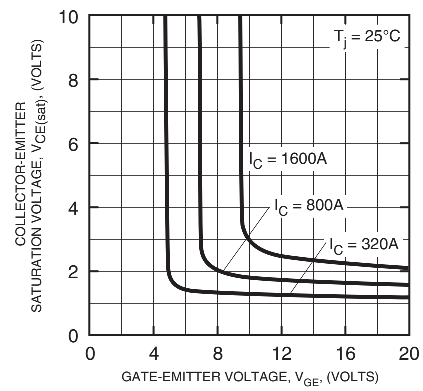
OUTPUT CHARACTERISTICS (TYPICAL)



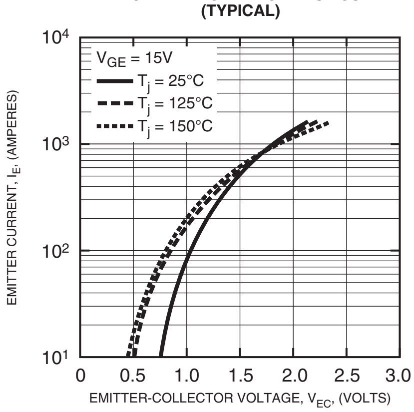
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



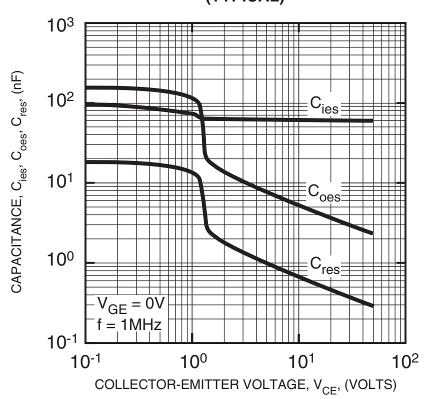
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



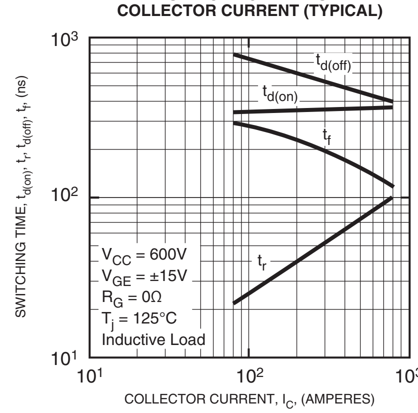
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



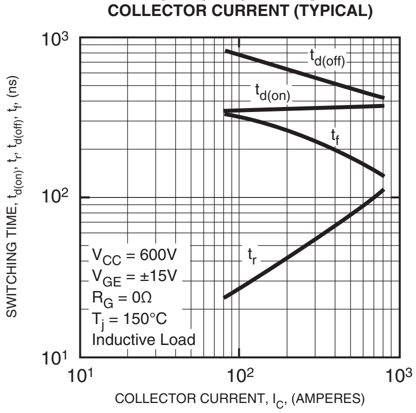
CAPACITANCE VS. V_{CE} (TYPICAL)



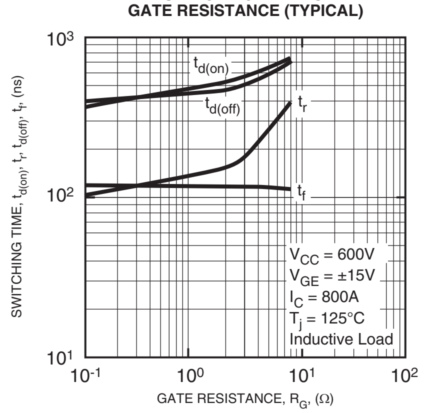
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



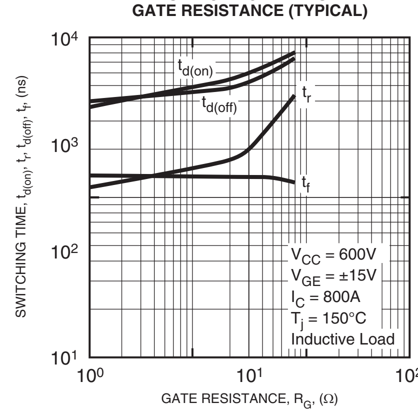
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



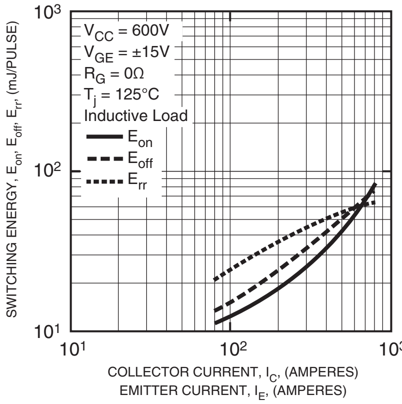
SWITCHING TIME VS. GATE RESISTANCE (TYPICAL)



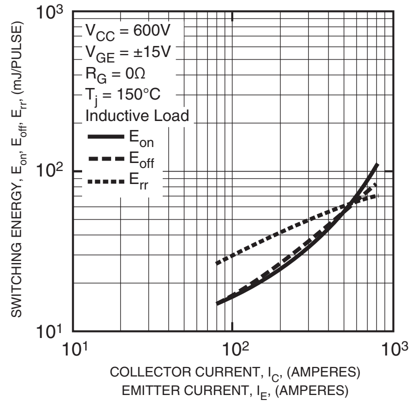
SWITCHING TIME VS. GATE RESISTANCE (TYPICAL)



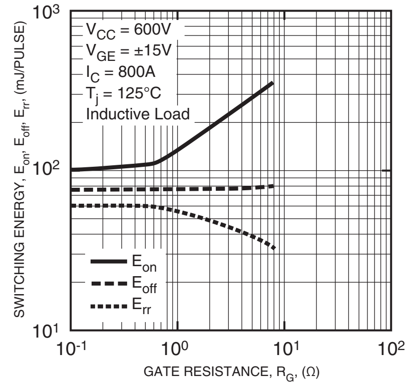
SWITCHING LOSS VS. COLLECTOR CURRENT (TYPICAL)



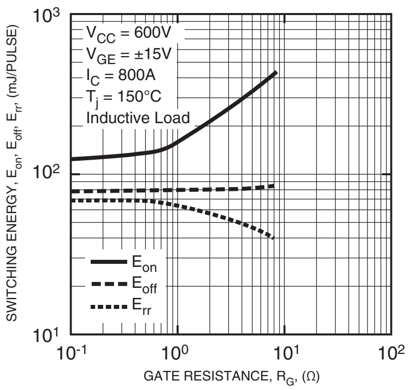
SWITCHING LOSS VS. COLLECTOR CURRENT (TYPICAL)



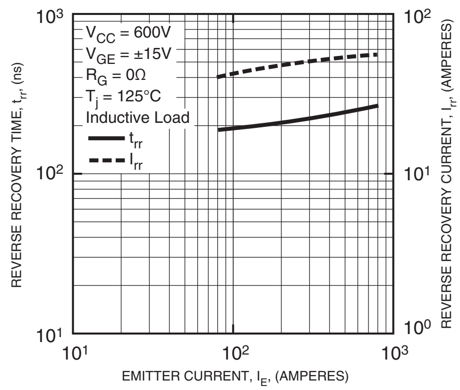
SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)



SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)



REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



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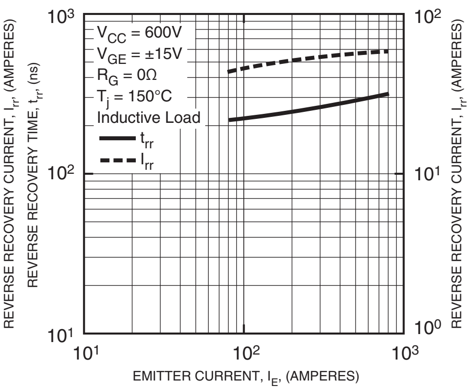
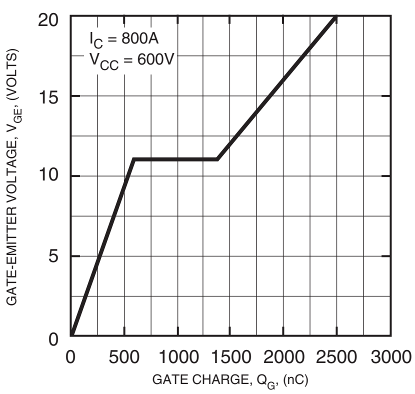
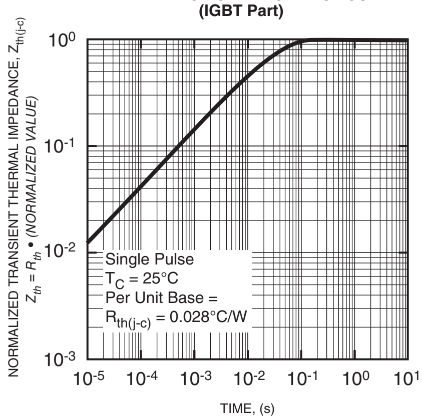


GATE CHARGE, V_{GE}



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT Part)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWDi Part)