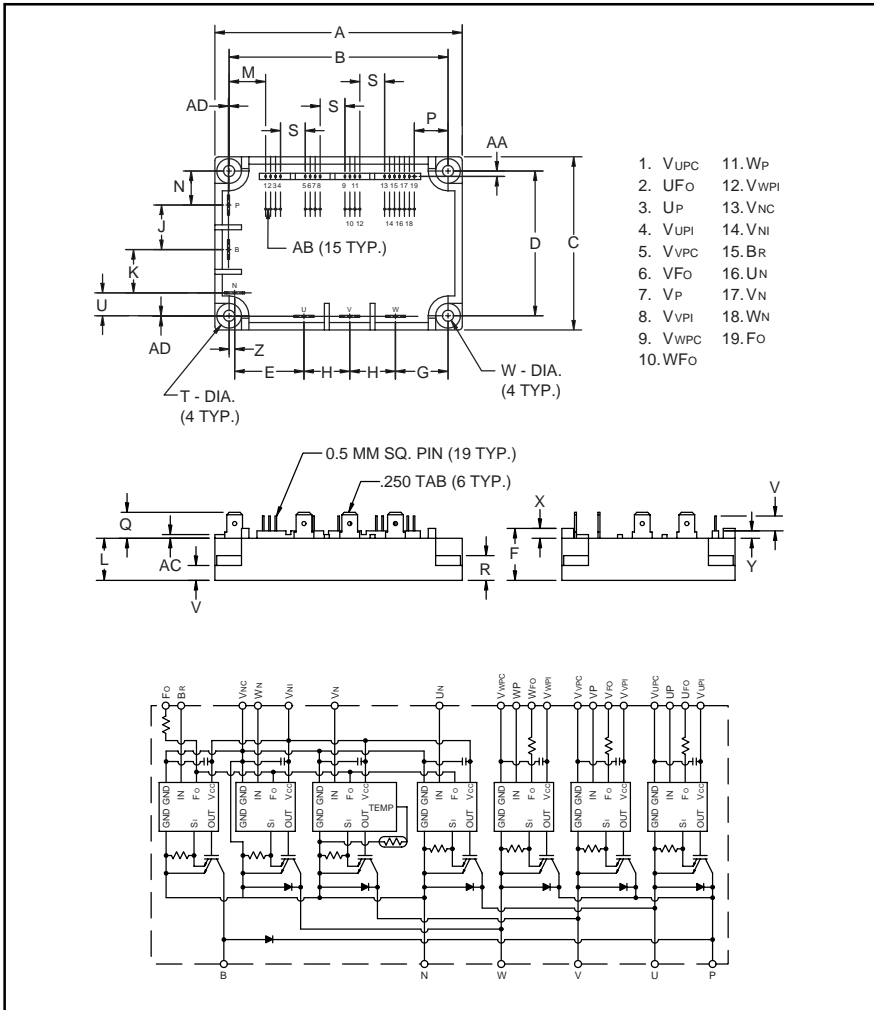


PM25RSB120

FLAT-BASE TYPE
INSULATED PACKAGE



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	3.96 ± 0.04	100.5 ± 1.0
B	3.48 ± 0.02	88.5 ± 0.5
C	2.76 ± 0.04	70.0 ± 1.0
D	2.30 ± 0.02	58.5 ± 0.5
E	1.191 ± 0.02	30.25 ± 0.5
F	0.83	21.0
G	0.75	19.0
H	0.73	18.5
J	0.71	18.0
K	0.69	17.5
L	0.67	17.0
M	0.581	14.76
N	0.541	13.75
P	0.541	13.74

Dimensions	Inches	Millimeters
Q	0.41	10.5
R	0.39	10.0
S	0.394 ± 0.010	10.00 ± 0.25
T	0.39 Dia.	Dia. 10.0
U	0.364	9.25
V	0.24	6.0
W	0.18 Dia.	Dia. 4.5
X	0.16	4.0
Y	0.12	3.0
Z	0.88 ± 0.02	2.25 ± 0.5
AA	0.086 ± 0.02	2.18 ± 0.5
AB	0.079 ± 0.010	2.00 ± 0.25
AC	0.06	1.5
AD	0.01 ± 0.02	0.25 ± 0.5



Description:

Mitsubishi Intelligent Power Modules are isolated base modules designed for power switching applications operating at frequencies to 20 kHz. Built-in control circuits provide optimum gate drive and protection for the IGBT and free-wheel diode power devices.

Features:

- Complete Output Power Circuit
- Gate Drive Circuit
- Protection Logic
 - Short Circuit
 - Over Current
 - Over Temperature
 - Under Voltage

Applications:

- Inverters
- UPS
- Motion/Servo Control
- Power Supplies

Ordering Information:

Example: Select the complete part number from the table below -i.e. PM25RSB120 is a 1200V, 25 Ampere Intelligent Power Module.

Type	Current Rating Amperes	V _{CES} Volts (x 10)
PM	25	120

PM25RSB120FLAT-BASE TYPE
INSULATED PACKAGE**Absolute Maximum Ratings, $T_j = 25^\circ\text{C}$ unless otherwise specified**

Ratings	Symbol	PM25RSB120	Units
Power Device Junction Temperature	T_j	-20 to 150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-40 to 125	$^\circ\text{C}$
Case Operating Temperature	T_C	-20 to 100	$^\circ\text{C}$
Mounting Torque, M4 Mounting Screws	—	0.98 ~ 1.47	N · m
Module Weight (Typical)	—	330	Grams
Supply Voltage Protected by OC and SC ($V_D = 13.5 - 16.5\text{V}$, Inverter Part, $T_j = 125^\circ\text{C}$)	$V_{\text{CC(prot.)}}$	800	Volts
Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)	V_{iso}	2500	Vrms

Control Sector

Supply Voltage (Applied between $V_{\text{UP1}}-V_{\text{UPC}}$, $V_{\text{VP1}}-V_{\text{VPC}}$, $V_{\text{WP1}}-V_{\text{WPC}}$, $V_{\text{N1}}-V_{\text{NC}}$)	V_D	20	Volts
Input Voltage (Applied between U_P-V_{UPC} , V_P-V_{VPC} , W_P-V_{WPC} , $U_N \cdot V_N \cdot W_N \cdot B_r-V_{\text{NC}}$)	V_{CIN}	20	Volts
Fault Output Supply Voltage Applied between ($U_{\text{FO}}-V_{\text{UPC}}$, $V_{\text{FO}}-V_{\text{VPC}}$, $W_{\text{FO}}-V_{\text{WPC}}$, F_O-V_{NC})	V_{FO}	20	Volts
Fault Output Current (Sink Current at U_{FO} , V_{FO} , W_{FO} and F_O Terminal)	I_{FO}	20	mA

IGBT Inverter Sector

Collector-Emitter Voltage ($V_D = 15\text{V}$, $V_{\text{CIN}} = 15\text{V}$)	V_{CES}	1200	Volts
Collector Current, ($T_C = 25^\circ\text{C}$)	I_C	25	Amperes
Peak Collector Current, ($T_C = 25^\circ\text{C}$)	I_{CP}	50	Amperes
Supply Voltage (Applied between P - N)	V_{CC}	900	Volts
Supply Voltage, Surge (Applied between P - N)	$V_{\text{CC(surge)}}$	1000	Volts
Collector Dissipation	P_C	132	Watts

Brake Sector

Collector-Emitter Voltage	V_{CES}	1200	Volts
Collector Current, ($T_C = 25^\circ\text{C}$)	I_C	10	Amperes
Peak Collector Current, ($T_C = 25^\circ\text{C}$)	I_{CP}	20	Amperes
Supply Voltage (Applied between P - N)	V_{CC}	900	Volts
Supply Voltage, Surge (Applied between P - N)	$V_{\text{CC(surge)}}$	1000	Volts
Collector Dissipation	P_C	62	Watts
Diode Forward Current	I_F	10	Amperes
Diode DC Reverse Voltage	$V_{\text{R(DC)}}$	1200	Volts

PM25RSB120

FLAT-BASE TYPE
INSULATED PACKAGE

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Control Sector						
Over Current Trip Level Inverter Part	OC	$-20^\circ\text{C} \leq T \leq 125^\circ\text{C}$, $V_D = 15\text{V}$	32	62	—	Amperes
Over Current Trip Level Brake Part			15	30	—	Amperes
Short Circuit Trip Level Inverter Part	SC	$-20^\circ\text{C} \leq T \leq 125^\circ\text{C}$, $V_D = 15\text{V}$	—	101	—	Amperes
Short Circuit Trip Level Brake Part			—	41	—	Amperes
Over Current Delay Time	$t_{\text{off(OC)}}$	$V_D = 15\text{V}$	—	10	—	μs
Over Temperature Protection	OT	Trip Level	111	118	125	$^\circ\text{C}$
	OT_r	Reset Level	—	100	—	$^\circ\text{C}$
Supply Circuit Under Voltage Protection	UV	Trip Level	11.5	12.0	12.5	Volts
	UV_r	Reset Level	—	12.5	—	Volts
Supply Voltage	V_D	Applied between $V_{\text{UP1}}-V_{\text{UPC}}$, $V_{\text{VP1}}-V_{\text{VPC}}$, $V_{\text{WP1}}-V_{\text{WPC}}$, $V_{\text{N1}}-V_{\text{NC}}$	13.5	15	16.5	Volts
Circuit Current	I_D	$V_D = 15\text{V}$, $V_{\text{CIN}} = 15\text{V}$, $V_{\text{N1}}-V_{\text{NC}}$	—	44	60	mA
		$V_D = 15\text{V}$, $V_{\text{CIN}} = 15\text{V}$, $V_{\text{XP1}}-V_{\text{XPC}}$	—	13	18	mA
Input ON Threshold Voltage	$V_{\text{th(on)}}$	Applied between	1.2	1.5	1.8	Volts
Input OFF Threshold Voltage	$V_{\text{th(off)}}$	U_P-V_{UPC} , V_P-V_{VPC} , W_P-V_{WPC} , $U_N \cdot V_N \cdot W_N \cdot B_r-V_{\text{NC}}$	1.7	2.0	2.3	Volts
PWM Input Frequency	f_{PWM}	3- ϕ Sinusoidal	—	15	20	kHz
Fault Output Current	$I_{\text{FO(H)}}$	$V_D = 15\text{V}$, $V_{\text{FO}} = 15\text{V}$	—	—	0.01	mA
	$I_{\text{FO(L)}}$	$V_D = 15\text{V}$, $V_{\text{FO}} = 15\text{V}$	—	10	15	mA
Minimum Fault Output Pulse Width	t_{FO}	$V_D = 15\text{V}$	1.0	1.8	—	ms

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
IGBT Inverter Sector						
Collector Cutoff Current	I_{CES}	$V_{CE} = V_{CES}, T_j = 25^\circ\text{C}$	—	—	1.0	mA
		$V_{CE} = V_{CES}, T_j = 125^\circ\text{C}$	—	—	10	mA
Emitter-Collector Voltage	V_{EC}	$-I_C = 25\text{A}, V_D = 15\text{V}, V_{CIN} = 5\text{V}$	—	2.5	3.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 25\text{A}$	—	2.5	3.5	Volts
		$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 25\text{A},$ $T_j = 125^\circ\text{C}$	—	2.2	3.2	Volts
Inductive Load Switching Times	t_{on}		0.5	1.0	2.5	μs
	t_{rr}	$V_D = 15\text{V}, V_{CIN} = 0 \leftrightarrow 15\text{V}$	—	0.15	0.3	μs
	$t_{C(on)}$	$V_{CC} = 600\text{V}, I_C = 25\text{A}$	—	0.4	1.0	μs
	t_{off}	$T_j = 125^\circ\text{C}$	—	2.0	3.0	μs
	$t_{C(off)}$		—	0.7	1.2	μs
Brake Sector						
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 10\text{A},$ $T_j = 25^\circ\text{C}$	—	2.8	3.8	Volts
		$V_D = 15\text{V}, V_{CIN} = 0\text{V}, I_C = 10\text{A},$ $T_j = 125^\circ\text{C}$	—	2.5	3.5	Volts
Diode Forward Voltage	V_{FM}	$-I_C = 10\text{A}, V_D = 15\text{V}, V_{CIN} = 5\text{V}$	—	2.5	3.5	Volts
Collector Cutoff Current	I_{CES}	$V_{CE} = V_{CES}, T_j = 25^\circ\text{C}$	—	—	1	mA
		$V_{CE} = V_{CES}, T_j = 125^\circ\text{C}$	—	—	10	mA

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**FLAT-BASE TYPE
INSULATED PACKAGE**

Thermal Characteristics

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Units
Junction to Case Thermal Resistance	$R_{th(j-c)Q}$	Each Inverter IGBT	—	—	0.95	°C/Watt
	$R_{th(j-c)F}$	Each Inverter FWDi	—	—	2.5	°C/Watt
	$R_{th(c-f)Q}$	Each Brake IGBT	—	—	2.0	°C/Watt
	$R_{th(c-f)F}$	Each Brake FWDi	—	—	2.5	°C/Watt
Contact Thermal Resistance	$R_{th(c-f)}$	Case to Fin Per Module, Thermal Grease Applied	—	—	0.036	°C/Watt

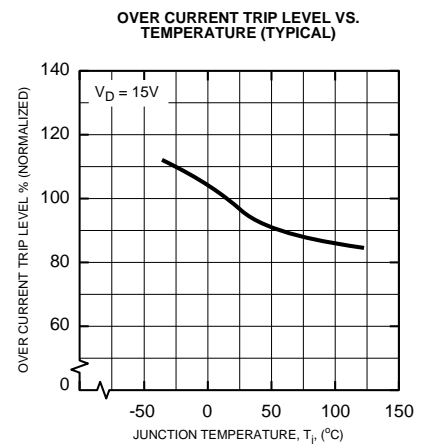
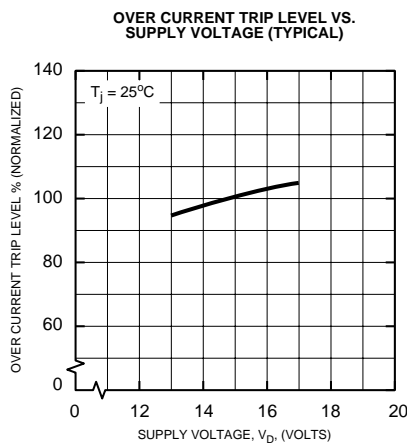
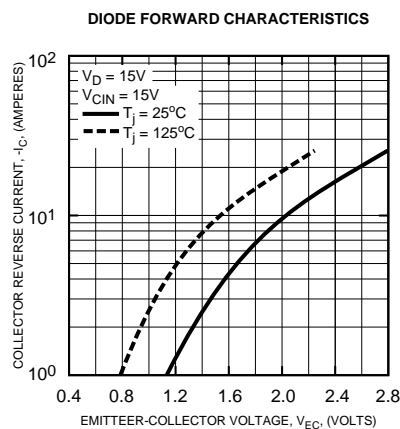
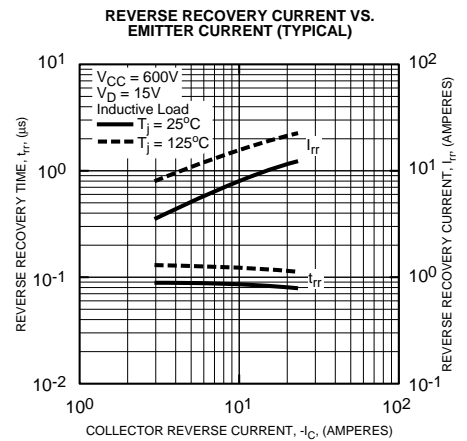
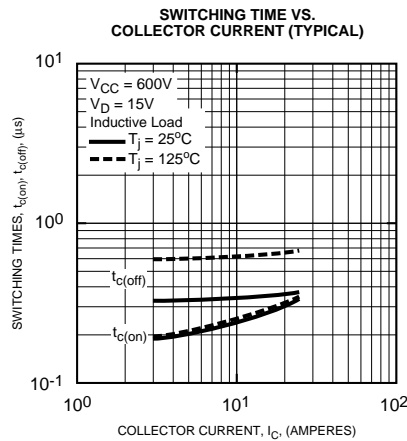
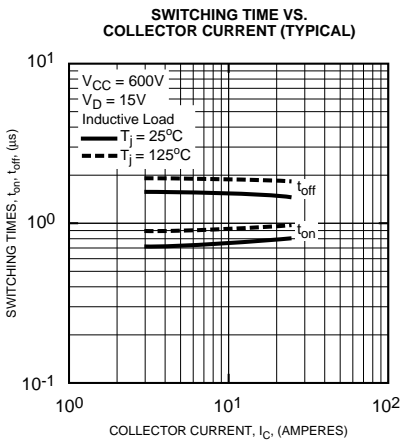
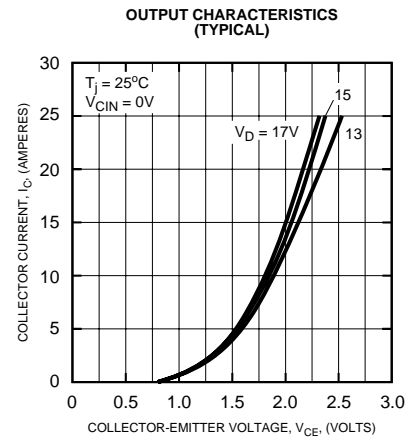
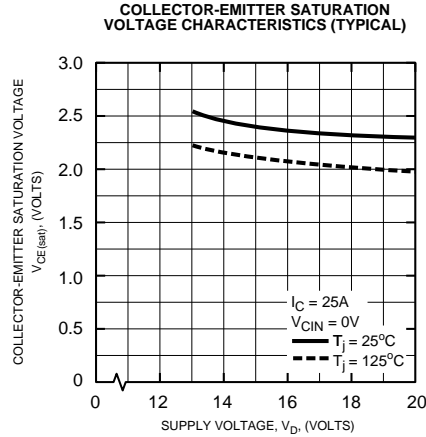
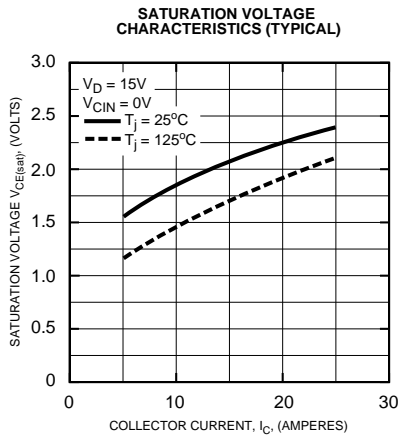
Recommended Conditions for Use

Characteristic	Symbol	Condition	Value	Units
Supply Voltage	V_{CC}	Applied across P-N Terminals	0 ~ 800	Volts
	V_D	Applied between V_{UP1} - V_{UPC} , V_{N1} - V_{NC} , V_{VP1} - V_{VPC} , V_{WP1} - V_{WPC}	15 ± 1.5	Volts
Input ON Voltage	$V_{CIN(on)}$	Applied between	0 ~ 0.8	Volts
Input OFF Voltage	$V_{CIN(off)}$	$U_P, V_P, W_P, U_N, V_N, W_N, B_r$	$4.0 \sim V_D$	Volts
PWM Input Frequency	f_{PWM}	Using Application Circuit	5 ~ 20	kHz
Minimum Dead Time	t_{dead}	Input Signal	≥ 2.5	μs

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FLAT-BASE TYPE
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Inverter Part

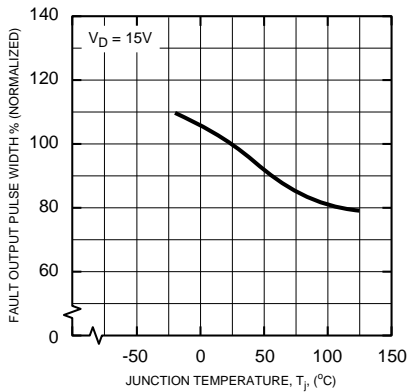


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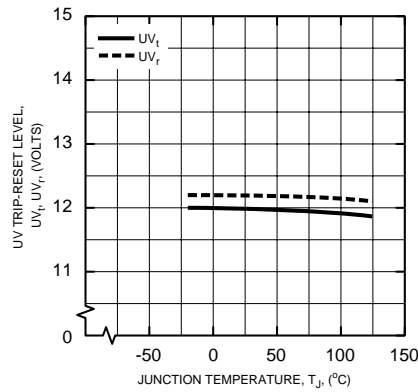
FLAT-BASE TYPE
INSULATED PACKAGE

Inverter Part

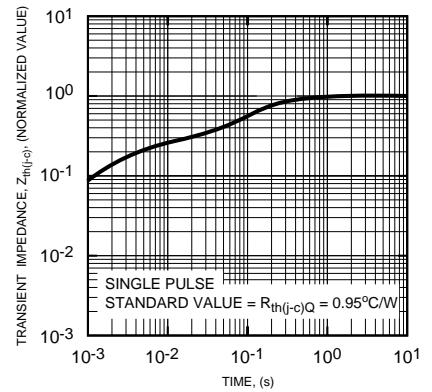
FAULT OUTPUT PULSE WIDTH VS. TEMPERATURE (TYPICAL)



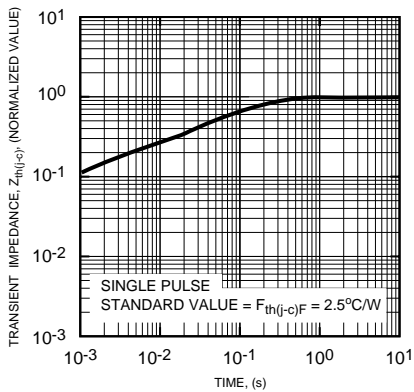
CONTROL SUPPLY VOLTAGE TRIP-RESET LEVEL TEMPERATURE DEPENDENCY (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (Each IGBT)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (Each FWD)

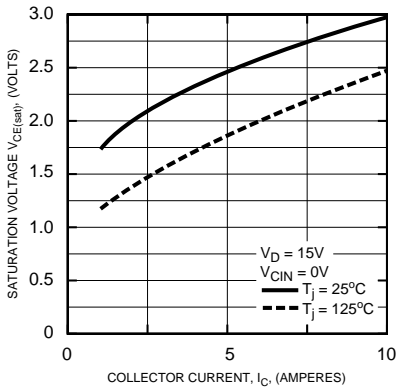


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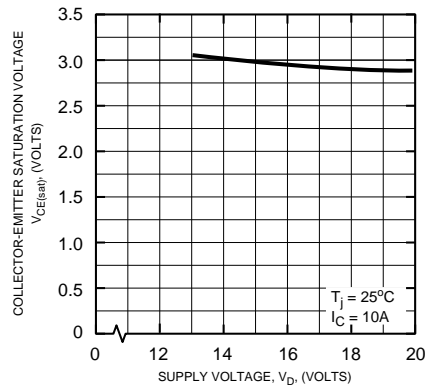
FLAT-BASE TYPE
INSULATED PACKAGE

Brake Part

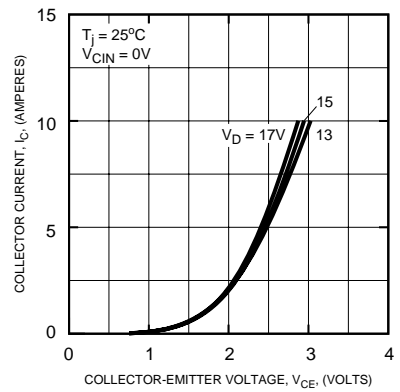
SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



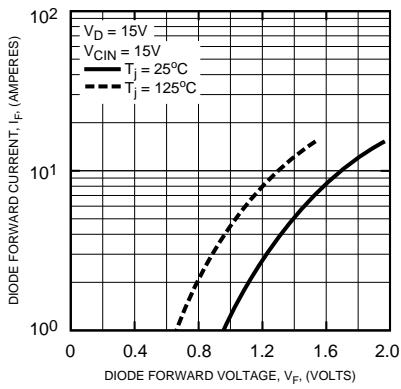
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



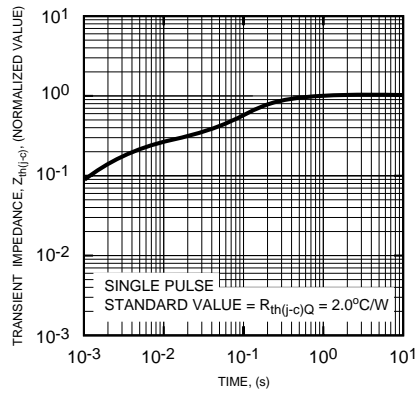
OUTPUT CHARACTERISTICS (TYPICAL)



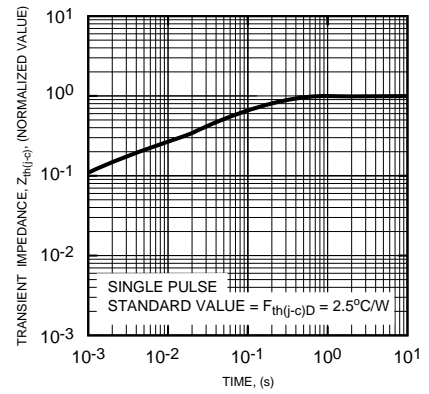
DIODE FORWARD CHARACTERISTICS



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (Each IGBT)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (Each FWD)



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