

< IGBT MODULES >

CM300DU-12NFH

HIGH POWER HIGH FREQUENTLY SWITCHING USE
INSULATED TYPE



Dual (Half-Bridge)

Collector current I_c **300 A**
 Collector-emitter voltage V_{CES} **600 V**
 Maximum junction temperature T_{jmax} ... **150 °C**

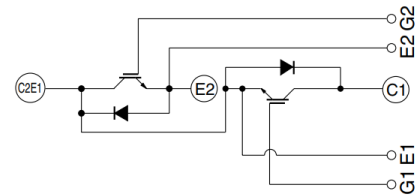
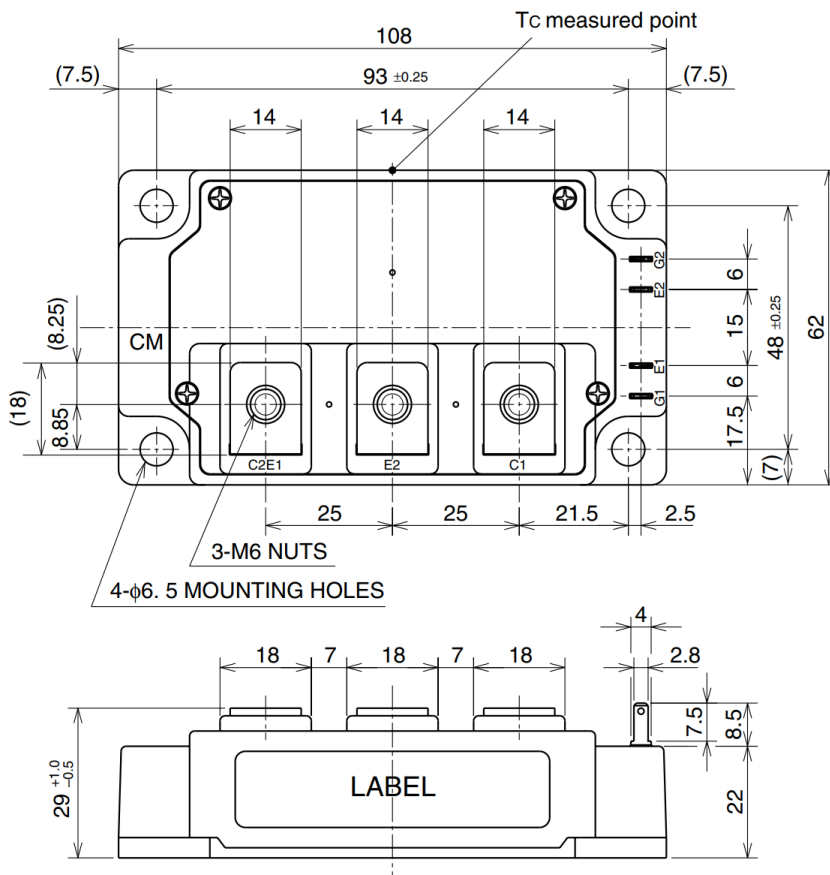
- Flat base Type
- Copper base plate
- RoHS Directive compliant
- UL Recognized under UL1557, File E323585

APPLICATION

High frequency (30 kHz ~ 60 kHz) switching use:
 Gradient amplifier, Induction heating, Power supply, etc.

OUTLINE DRAWING & INTERNAL CONNECTION

Dimension in mm



CIRCUIT DIAGRAM

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ABSOLUTE MAXIMUM RATINGS ($T_J=25\text{ }^{\circ}\text{C}$, unless otherwise specified)

Symbol	Item	Conditions	Rating	Unit
V_{CES}	Collector-emitter voltage	G-E short-circuited	600	V
V_{GES}	Gate-emitter voltage	C-E short-circuited	± 20	V
I_C	Collector current	(Note.2)	300	A
I_{CRM}		Pulse, Repetitive (Note.3)	600	
P_{tot}	Total power dissipation	$T_C=25\text{ }^{\circ}\text{C}$ (Note.2, 4)	780	W
P_{tot}'		$T_C'=25\text{ }^{\circ}\text{C}$ (Note.2, 5)	1250	
I_E (Note.1)	Emitter current	(Note.2)	300	A
I_{ERM} (Note.1)		Pulse, Repetitive (Note.3)	600	
V_{isol}	Isolation voltage	Charged part to base plate, RMS, $f=60\text{ Hz}$, AC 1 min	2500	V
T_J	Junction temperature	-	$-40 \sim +150$	$^{\circ}\text{C}$
T_{stg}	Storage temperature	-	$-40 \sim +125$	

ELECTRICAL CHARACTERISTICS ($T_J=25\text{ }^{\circ}\text{C}$, unless otherwise specified)

Symbol	Item	Conditions	Limits			Unit
			Min.	Typ.	Max.	
I_{CES}	Collector-emitter cut-off current	$V_{CE}=V_{CES}$, G-E short-circuited	-	-	1	mA
I_{GES}	Gate-emitter leakage current	$V_{GE}=V_{GES}$, C-E short-circuited	-	-	0.5	μA
$V_{GE(th)}$	Gate-emitter threshold voltage	$I_C=30\text{ mA}$, $V_{CE}=10\text{ V}$	5	6	7	V
V_{CESat}	Collector-emitter saturation voltage	$I_C=300\text{ A}$, $V_{GE}=15\text{ V}$ (Note.6)	-	$T_J=25\text{ }^{\circ}\text{C}$ 2.0	2.7	V
		$T_J=125\text{ }^{\circ}\text{C}$		1.95	-	
C_{ies}	Input capacitance	$V_{CE}=10\text{ V}$, G-E short-circuited	-	-	83	nF
C_{oes}	Output capacitance		-	-	5.4	
C_{res}	Reverse transfer capacitance		-	-	3.0	
Q_G	Gate charge	$V_{CC}=300\text{ V}$, $I_C=300\text{ A}$, $V_{GE}=15\text{ V}$	-	1860	-	nC
$t_{d(on)}$	Turn-on delay time	$V_{CC}=300\text{ V}$, $I_C=300\text{ A}$, $V_{GE}=\pm 15\text{ V}$, $R_G=4.2\text{ }\Omega$, Inductive load	-	-	350	ns
t_r	Rise time		-	-	150	
$t_{d(off)}$	Turn-off delay time		-	-	700	
t_f	Fall time		-	-	150	
V_{EC}	Emitter-collector voltage (Note.1)	$I_E=300\text{ A}$, G-E short-circuited (Note.6)	-	1.9	2.4	V
t_{rr}	Reverse recovery time (Note.1)	$V_{CC}=300\text{ V}$, $I_E=300\text{ A}$, $V_{GE}=\pm 15\text{ V}$,	-	-	200	ns
Q_{rr}	Reverse recovery charge (Note.1)	$R_G=4.2\text{ }\Omega$, Inductive load	-	5.5	-	μC
r_g	Internal gate resistance	$T_C=25\text{ }^{\circ}\text{C}$, per switch	-	0.8	-	Ω
R_G	External gate resistance	Per switch	2.1	-	21	Ω

THERMAL RESISTANCE CHARACTERISTICS

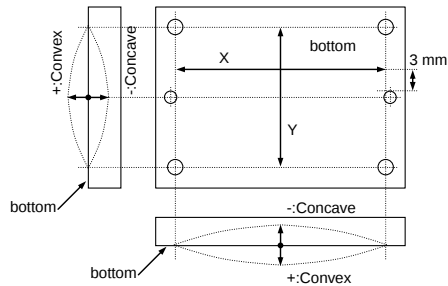
Symbol	Item	Conditions	Limits			Unit
			Min.	Typ.	Max.	
$R_{th(j-c)Q}$	Thermal resistance (Note.4)	Junction to case, per IGBT	-	-	0.16	K/W
$R_{th(j-c)D}$		Junction to case, per FWDi	-	-	0.24	K/W
$R_{th(c-s)}$	Contact thermal resistance (Note.4)	Case to heat sink, per 1/2 module, Thermal grease applied (Note.7)	-	0.04	-	K/W
$R_{th(j-c')Q}$	Thermal resistance (Note.5)	Junction to case, per IGBT	-	-	0.10	K/W
$R_{th(j-c')D}$		Junction to case, per FWDi	-	-	0.14	K/W

MECHANICAL CHARACTERISTICS

Symbol	Item	Conditions	Limits			Unit
			Min.	Typ.	Max.	
M_t	Mounting torque	Main terminals M 5 screw	3.5	-	4.5	N·m
M_s		Mounting to heat sink M 6 screw	3.5	-	4.5	
m	Weight	-	-	400	-	g
e_c	Flatness of base plate	On the centerline X, Y (Note.8)	-100	-	+100	μm

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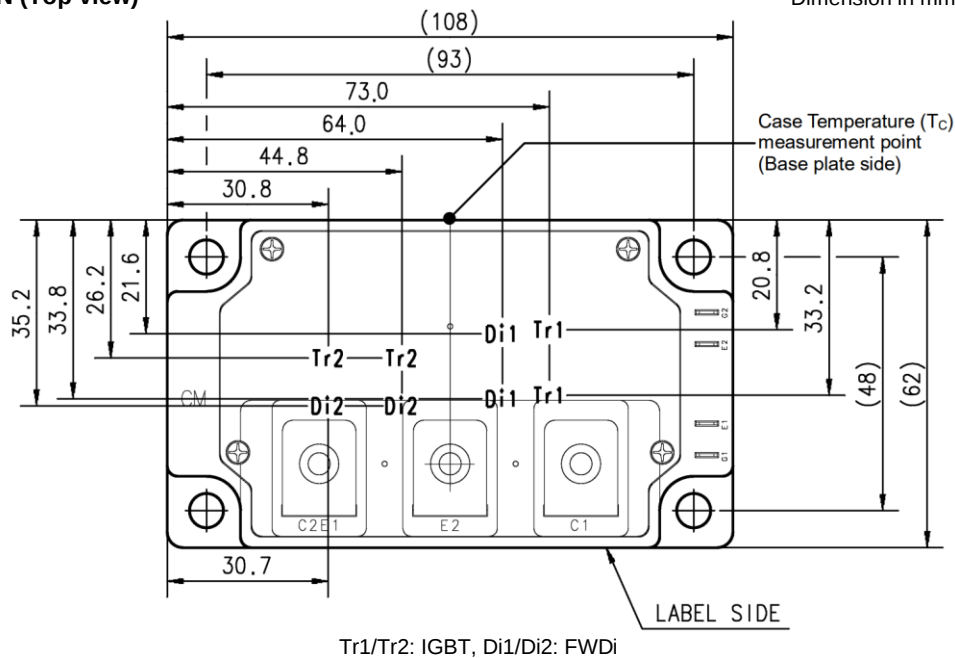
- Note1. Represent the ratings of the anti-parallel, emitter-collector free wheeling diode (FWDi).
 2. The device junction temperature is T_{jmax} rating (150°C) or less.
 3. Pulse width and repetition rate should be such that the device junction temperature (T_j) does not exceed T_{jmax} rating.
 4. Case temperature (T_c) is defined on the base plate side. (Refer to the figure of chip location)
 5. Case temperature (T_c') and heat sink temperature (T_s') are defined on the each surface just under the chip. (Refer to the figure of chip location)
 6. Pulse width and repetition rate should be such as to cause negligible temperature rise.
 7. Typical value is measured by using thermally conductive grease of $\lambda=0.9 \text{ W/(m}\cdot\text{K)}$.
 8: Base plate flatness measurement points are as in the following figure.



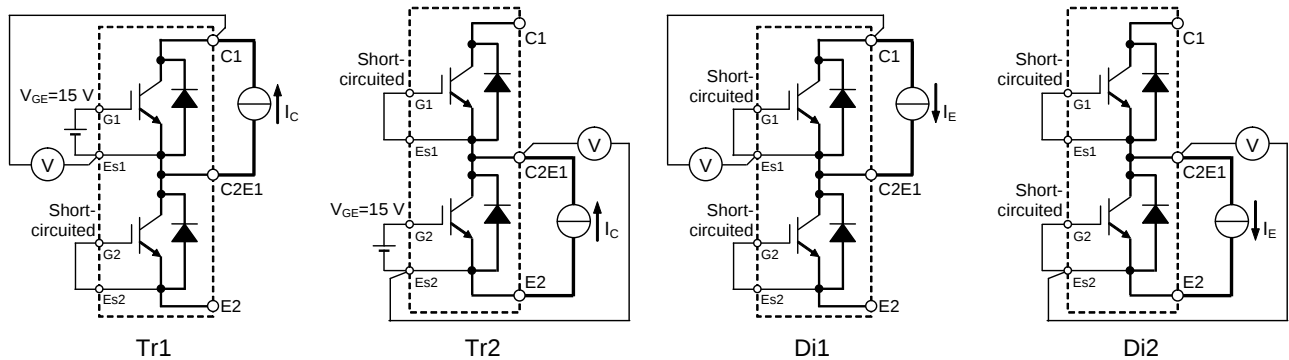
9: No short circuit capability is designed.

CHIP LOCATION (Top view)

Dimension in mm, tolerance: $\pm 1 \text{ mm}$

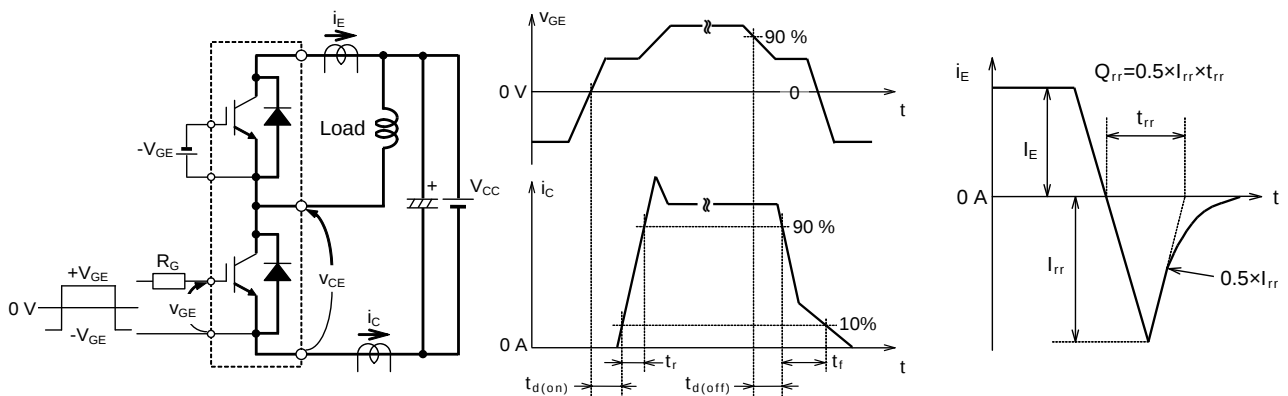


TEST CIRCUIT AND WAVEFORMS

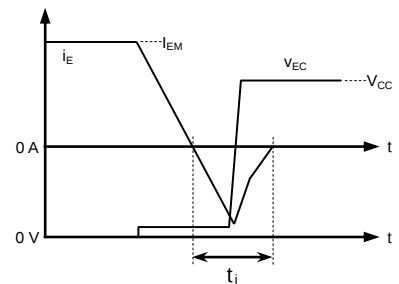
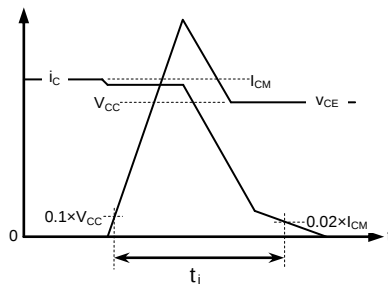
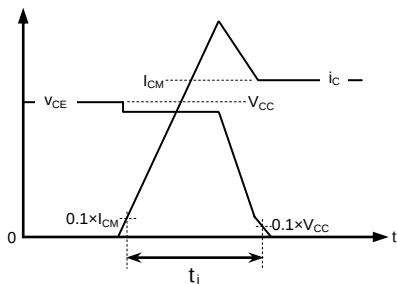


V_{CEsat} test circuit

V_{EC} test circuit



t_{rr} , Q_{rr} test waveform



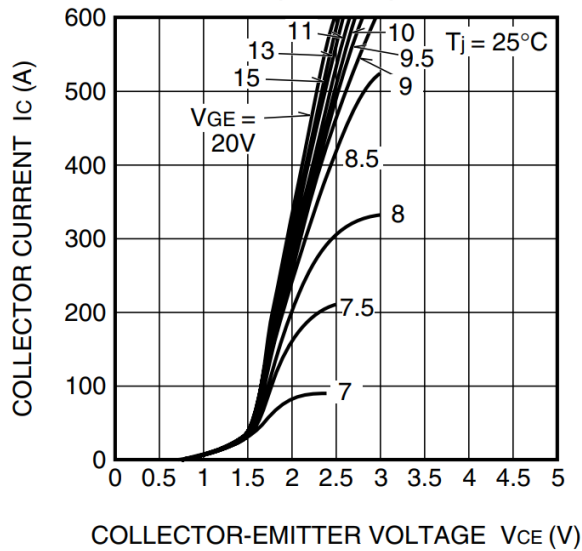
Turn-on / Turn-off switching energy and Reverse recovery energy test waveforms (Integral time instruction drawing)

CM300DU-12NFH

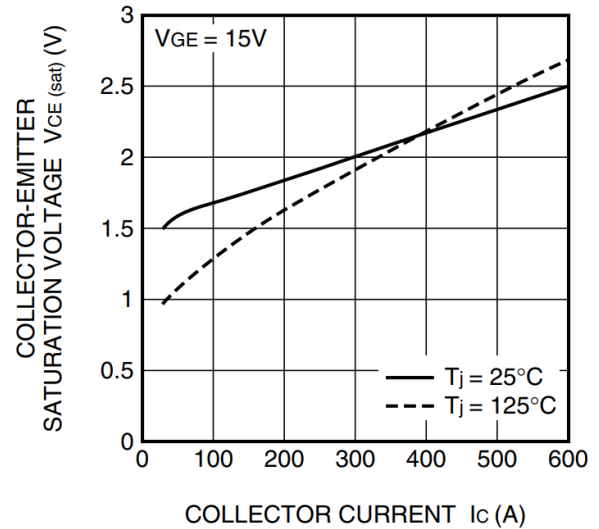
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PERFORMANCE CURVES

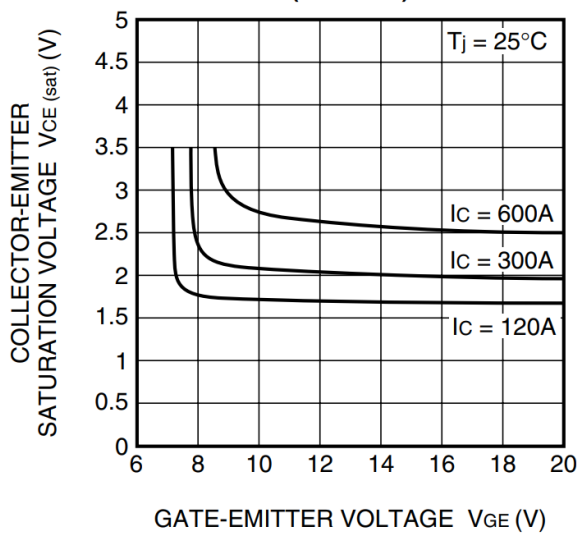
OUTPUT CHARACTERISTICS
(TYPICAL)



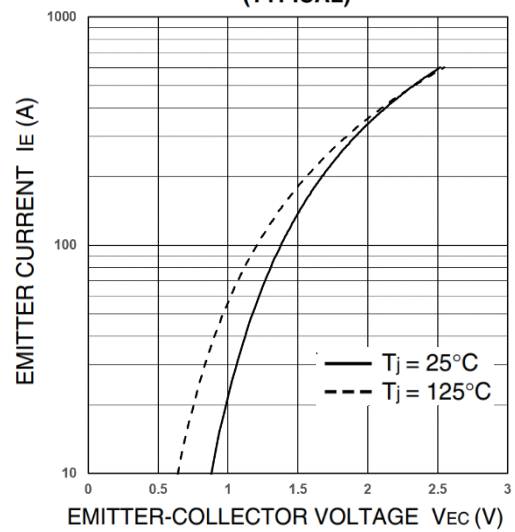
COLLECTOR-EMITTER SATURATION
VOLTAGE CHARACTERISTICS
(TYPICAL)



COLLECTOR-EMITTER SATURATION
VOLTAGE CHARACTERISTICS
(TYPICAL)



FREE-WHEEL DIODE
FORWARD CHARACTERISTICS
(TYPICAL)

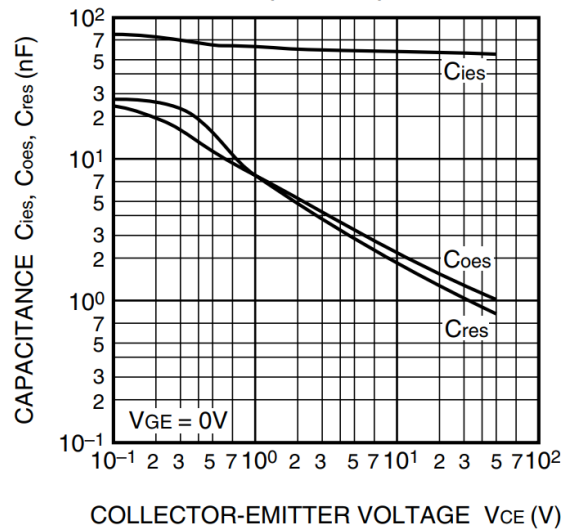


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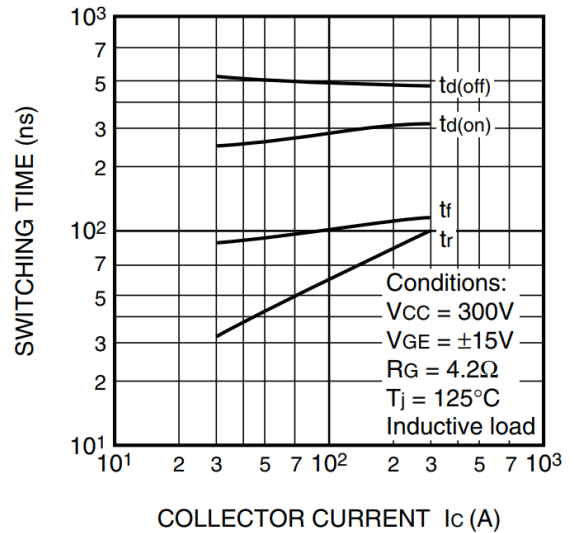
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PERFORMANCE CURVES

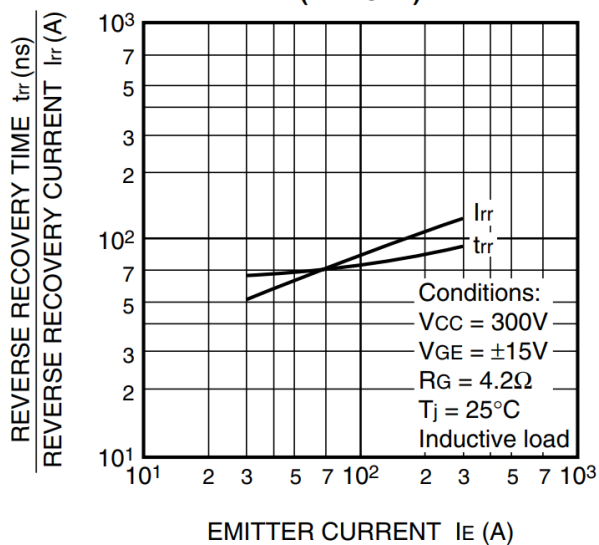
**CAPACITANCE- V_{CE}
CHARACTERISTICS
(TYPICAL)**



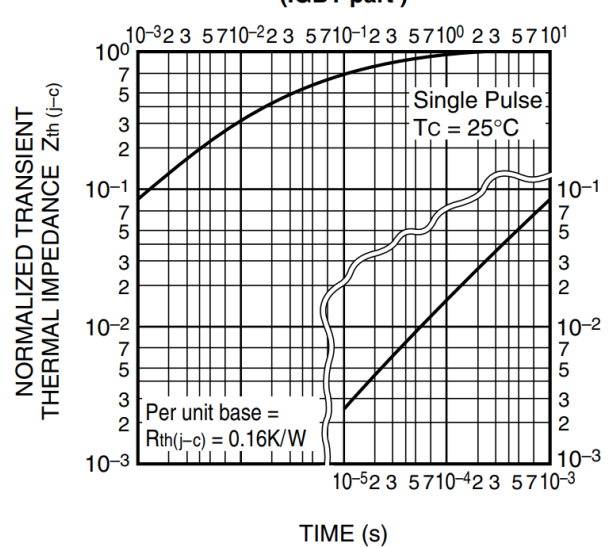
**HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)**



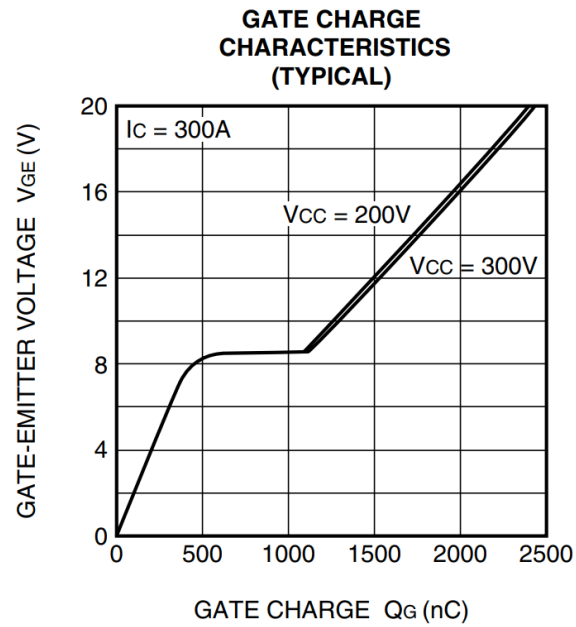
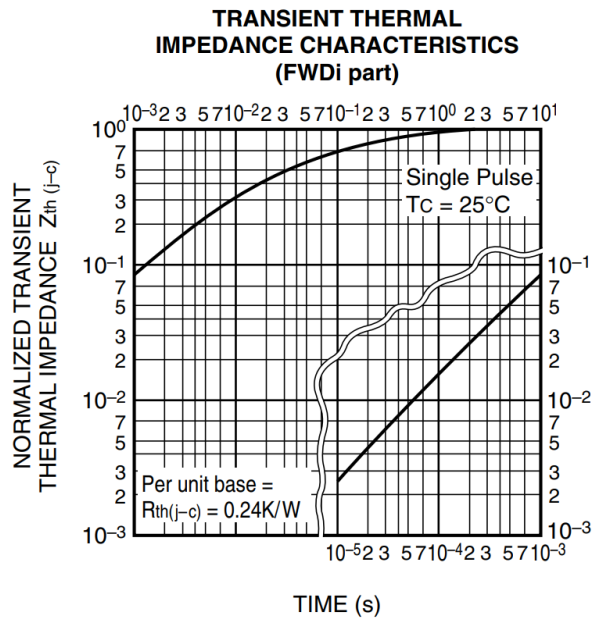
**REVERSE RECOVERY CHARACTERISTICS
OF FREE-WHEEL DIODE
(TYPICAL)**



**TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(IGBT part)**



PERFORMANCE CURVES



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