

IGBT MODULE (N series)

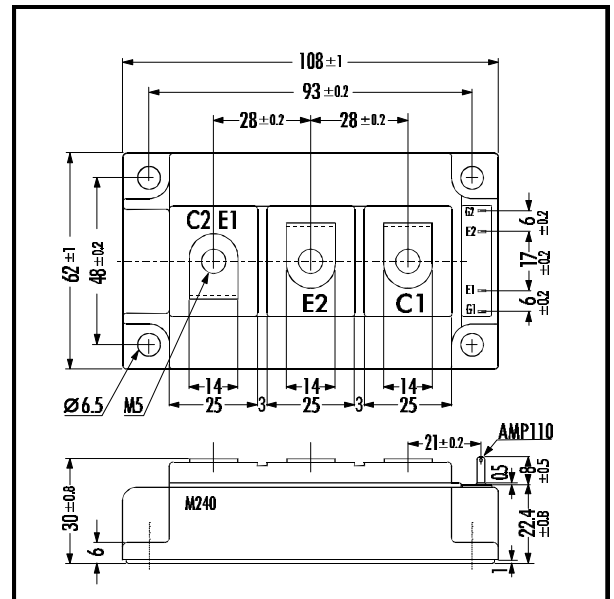
■ Features

- *Square RBSOA*
- *Low Saturation Voltage*
- *Less Total Power Dissipation*
- *Improved FWD Characteristic*
- *Minimized Internal Stray Inductance*
- *Overcurrent Limiting Function (4~5 Times Rated Current)*

■ Applications

- *High Power Switching*
- *A.C. Motor Controls*
- *D.C. Motor Controls*
- *Uninterruptible Power Supply*

■ Outline Drawing



■ Maximum Ratings and Characteristics

• **Absolute Maximum Ratings** ($T_c=25^{\circ}\text{C}$)

Items		Symbols	Ratings	Units
Collector-Emitter Voltage		V_{CES}	1200	V
Gate -Emitter Voltage		V_{GES}	± 20	V
Collector Current	Continuous	I_C	200	A
	1ms	$I_{C \text{ PULSE}}$	400	
	Continuous	$-I_C$	200	
	1ms	$-I_{C \text{ PULSE}}$	400	
Max. Power Dissipation		P_C	1500	W
Operating Temperature		T_j	+150	°C
Storage Temperature		T_{stg}	-40 ~ +125	°C
Isolation Voltage	A.C. 1min.	V_{is}	2500	V
Screw Torque		Mounting *1	3.5	Nm
		Terminals *2	4.5	

Note: *1:Recommendable Value; 2.5 – 3.5 Nm (M5) or (M6)
*2:Recommendable Value; 3.5 – 4.5 Nm (M6)

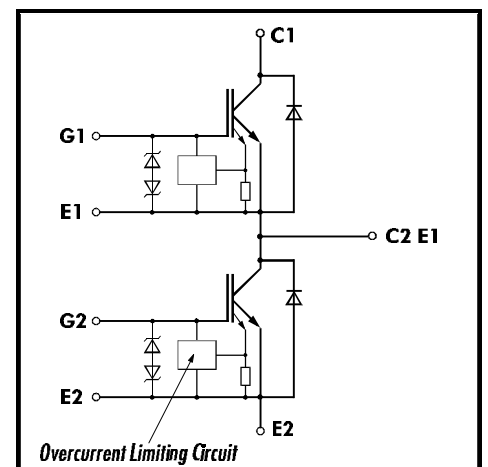
• **Electrical Characteristics** (at $T_j=25^{\circ}\text{C}$)

Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Zero Gate Voltage Collector Current	I_{CES}	$V_{GE}=0V$ $V_{CE}=1200V$			2.0	mA
Gate-Emitter Leakage Current	I_{GES}	$V_{CE}=0V$ $V_{GE}=\pm 20V$			30	μA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=20V$ $I_C=200mA$	4.5		7.5	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V$ $I_C=200A$			3.3	V
Input capacitance	C_{ies}	$V_{GE}=0V$		32000		pF
Output capacitance	C_{oes}	$V_{CE}=10V$		11600		
Reverse Transfer capacitance	C_{res}	$f=1MHz$		10320		
Turn-on Time	t_{ON}	$V_{CC}=600V$		0.65	1.2	μs
	t_r	$I_C=200A$		0.25	0.6	
Turn-off Time	t_{OFF}	$V_{GE}=\pm 15V$		0.85	1.5	
	t_f	$R_G=4.7\Omega$		0.35	0.5	
Diode Forward On-Voltage	V_F	$I_F=200A$ $V_{GE}=0V$			3.0	V
Reverse Recovery Time	t_{rr}	$I_F=200A$			350	ns

- **Thermal Characteristics**

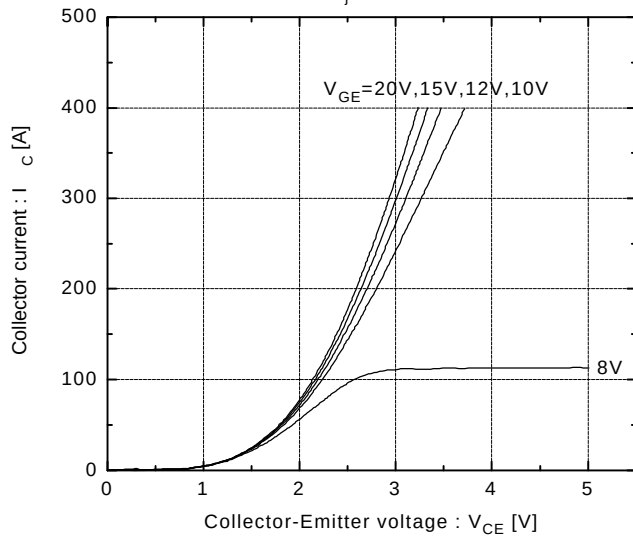
Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance	$R_{th(j-c)}$	IGBT			0.085	°C/W
	$R_{th(j-c)}$	Diode			0.22	
	$R_{th(j-a)}$	With Thermal Compound		0.025		

■ Equivalent Circuit



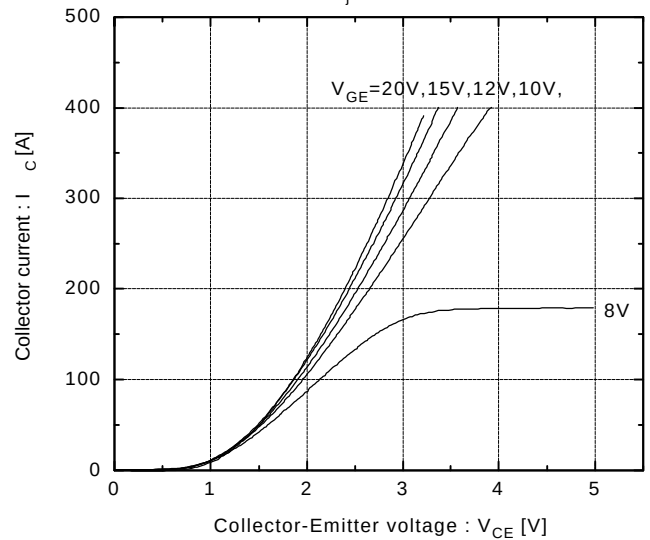
Collector current vs. Collector-Emitter voltage

$T_J = 25^\circ\text{C}$



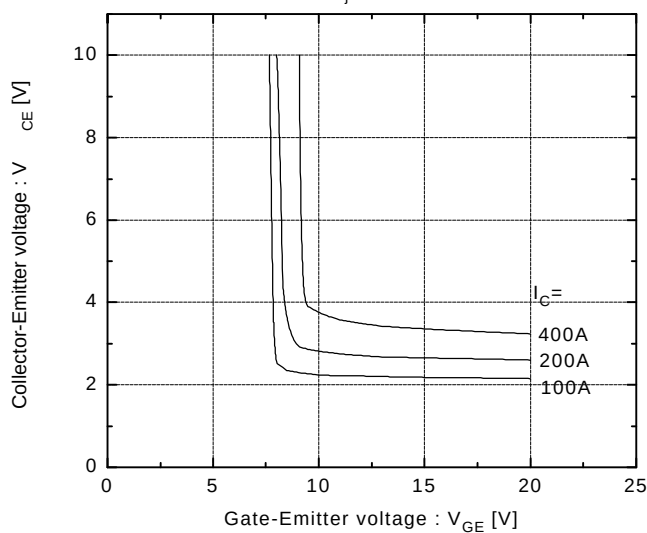
Collector current vs. Collector-Emitter voltage

$T_J = 125^\circ\text{C}$



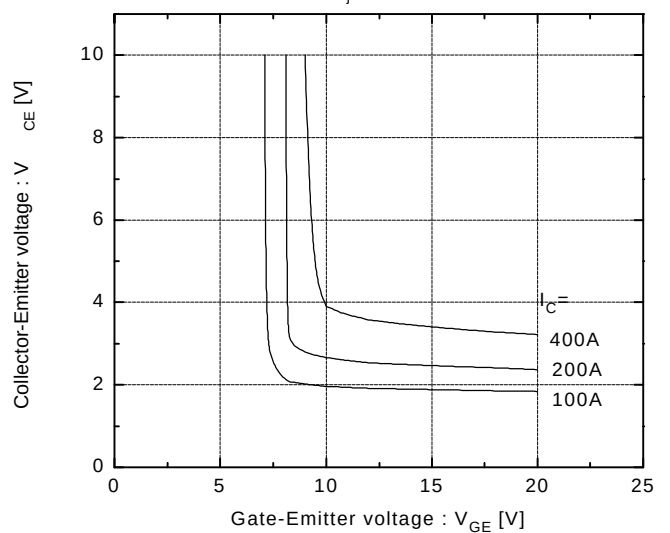
Collector-Emitter vs. Gate-Emitter voltage

$T_J = 25^\circ\text{C}$



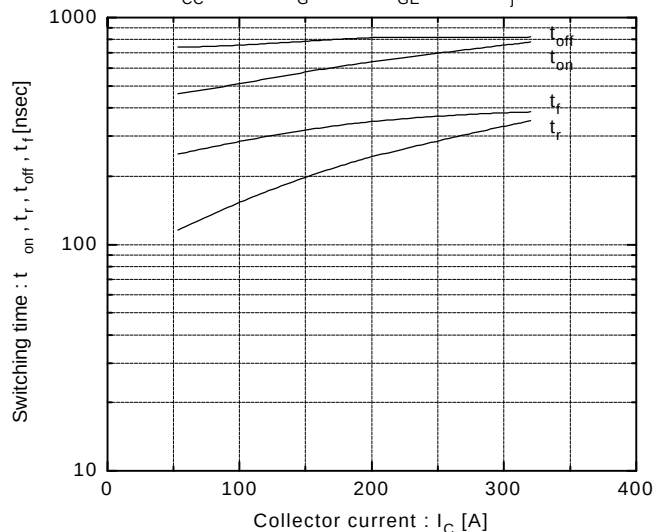
Collector-Emitter vs. Gate-Emitter voltage

$T_J = 125^\circ\text{C}$



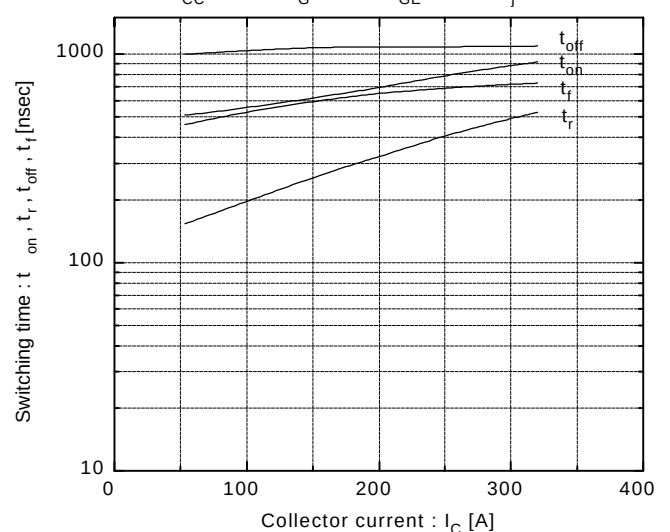
Switching time vs. Collector current

$V_{CC} = 600V, R_G = 4.7\Omega, V_{GE} = \pm 15V, T_J = 25^\circ\text{C}$



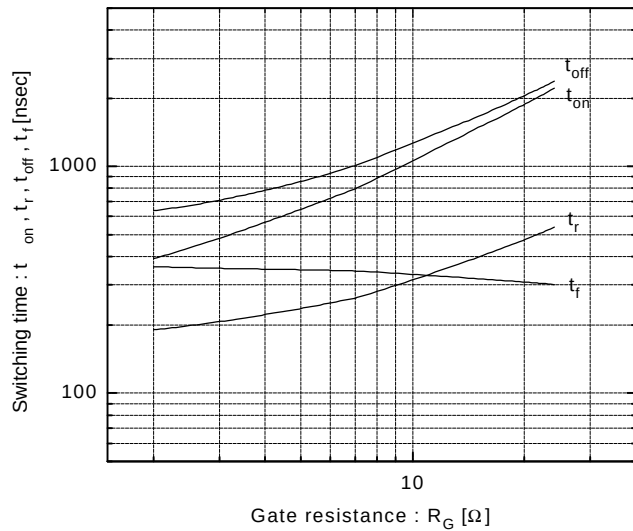
Switching time vs. Collector current

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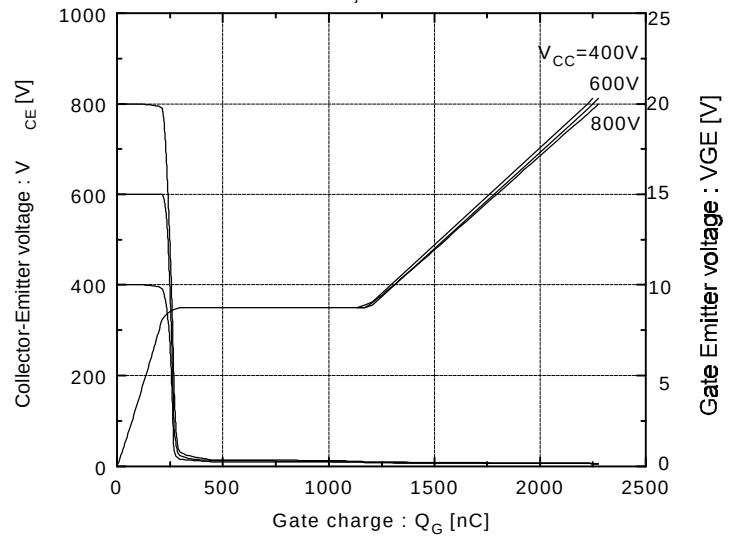
Switching time vs. R_G

$V_{CC}=600V$, $I_C=200A$, $V_{GE}=\pm 15V$, $T_J=25^\circ C$



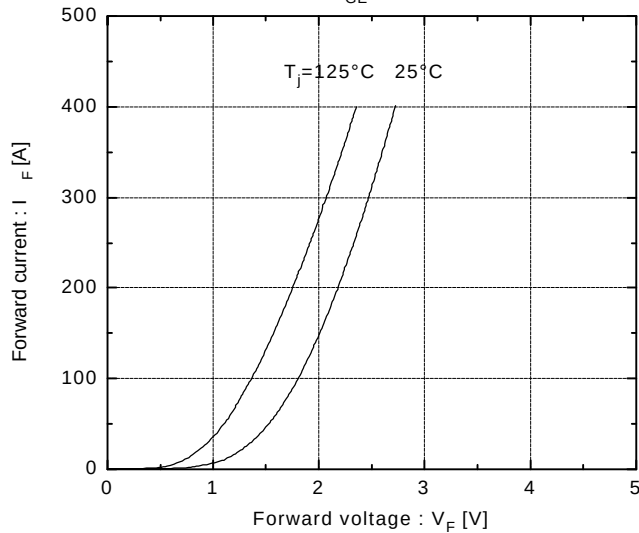
Dynamic input characteristics

$T_J=25^\circ C$



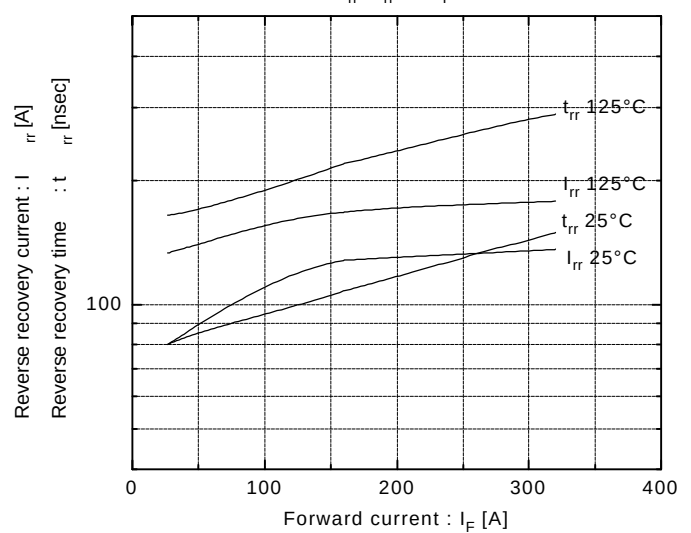
Forward current vs. Forward voltage

$V_{GE}=0V$

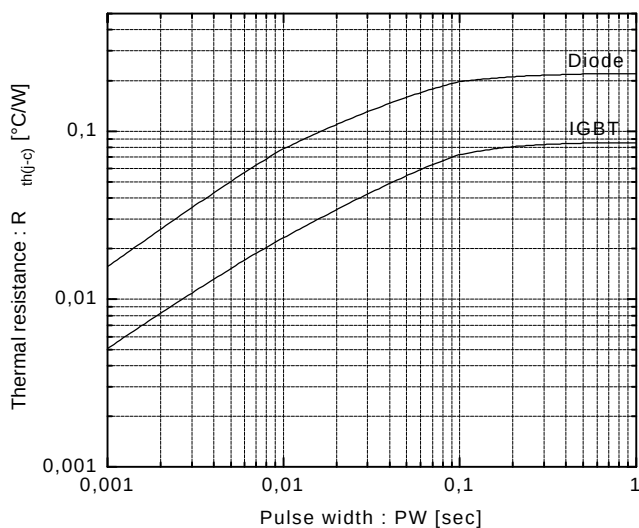


Reverse recovery characteristics

t_{rr} , I_{rr} vs. I_F

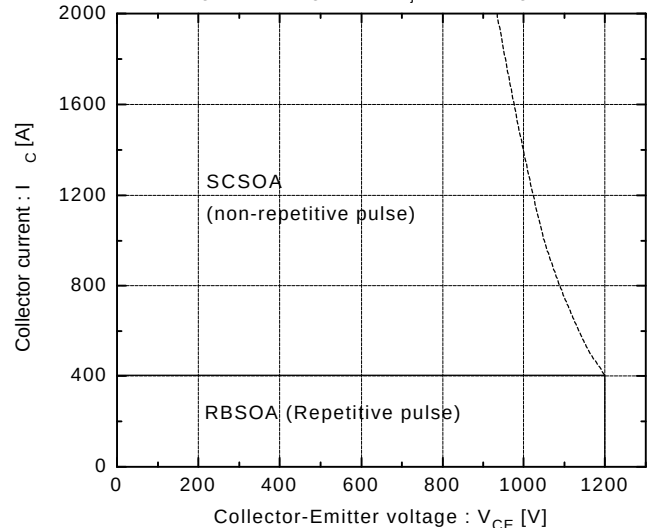


Transient thermal resistance

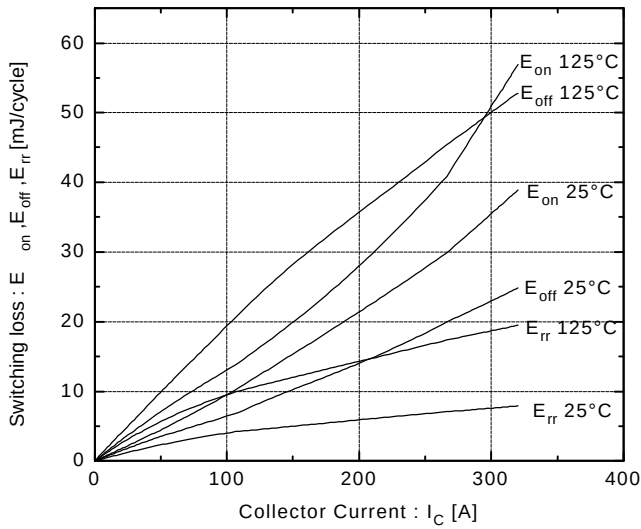


Reversed biased safe operating area

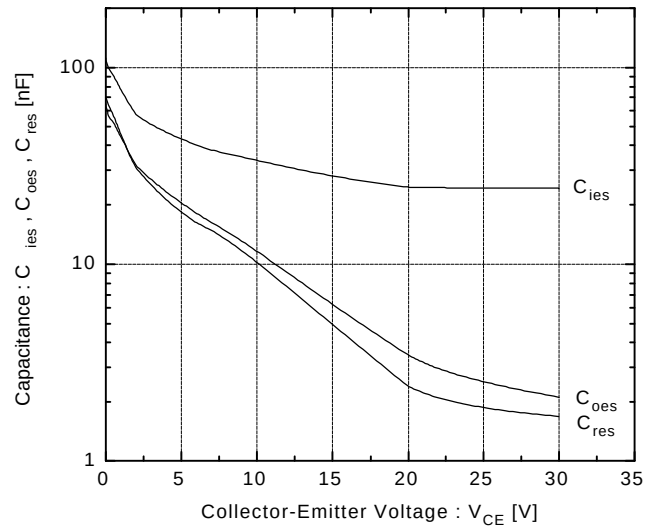
$+V_{GE}=15V$, $-V_{GE}\leq 15V$, $T_J\leq 125^\circ C$, $R_G\geq 4.7\Omega$



Switching loss vs. Collector current

 $V_{CC}=600V$, $R_G=4.7\Omega$, $V_{GE}=\pm 15V$


Capacitance vs. Collector-Emitter voltage

 $T_J=25^\circ C$

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