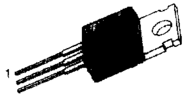
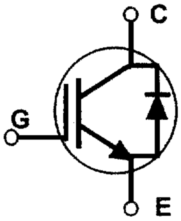
SGP5N60RUFD

CO-PAK IGBT

TO-220





FEATURES

- * Short Circuit rated 10uS @Tc=100℃
- * High Speed Switching
- * Low Saturation Volatge
  - : V_{CE}(sat) = 2.0 V @ Ic=5A
- * High Input Impedance
- * CO-PAK, IGBT with FRD
  - : Trr = 37nS (Typ.)

APPLICATIONS

- * AC & DC Motor controls
- * General Purpose Inverters
- * Robotics , Servo Controls
- * Power Supply
- * Lamp Ballast

ABSOLUTE MAXIMUM RATINGS

Symbol	Characteristics	Rating	Units
V_{CES}	Collector-Emitter Voltage	600	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ Tc = 25℃	8	A
	Collector Current @ Tc = 100℃	5	A
$I_{CM\,(1)}$	Pulsed Collector Current	15	A
I_F	Diode Continuous Forward Current @ Tc = 100℃	8	A
I_{FM}	Diode Maximum Forward Current	56	A
P_D	Maximum Power Dissipation @Tc = 25℃	60	W
	Maximum Power Dissipation @Tc = 100℃	25	W
Tsc	Short Circuit Withstand Time	10	uS
Tj	Operating Junction Temperature	-55 ~ 150	℃
Tstg	Storage Temperature Range	-55 ~ 150	℃
TL	Maximum Lead Temp. For Soldering Purposes, ⅛″ from case for 5 seconds	300	℃

Notes: (1) Repetitive rating : Pulse width limited by max. junction temperature

ELECTRICAL CHARACTERISTICS (IGBT PART)
(T_C=25℃,Unless Otherwise Specified)

Symbol	Characteristics	Test Conditions	Min	Typ	Max	Units
BV_{CES}	C - E Breakdown Voltage	V_{GE} = 0V , I_C = 250μA	600	-	-	V
$\Delta V_{CES}/\Delta T_J$	Temperature Coeff. of Breakdown Voltage	V_{GE} = 0V , I_C = 1mA	-	0.6	-	V/℃
$V_{GE(th)}$	G - E threshold voltage	I_C = 5mA , V_{CE} = V_{GE}	5.0	6.0	8.0	V
I_{CES}	Collector cutoff Current	V_{CE} = V_{CES} , V_{GE} = 0V	-	-	250	uA
I_{GES}	G - E leakage Current	V_{GE} = V_{GES} , V_{CE} = 0V	-	-	100	nA
V_{CE}(sat)	Collector to Emitter saturation voltage	Ic=5A, V_{GE} = 15V	-	2.0	2.7	V
		Ic=8A, V_{GE} = 15V	-	2.5	-	V
Cies	Input capacitance	V_{GE} = 0V , f = 1㎒	-	337	-	pF
Coes	Output capacitance	V_{CE} = 30V	-	60	-	pF
Cres	Reverse transfer capacitance		-	13	-	pF
td(on)	Turn on delay time	V_{CC} = 300V , I_C = 5A	-	9	-	nS
tr	Turn on rise time	V_{GE} = 15V	-	18	-	nS
td(off)	Turn off delay time	R_G = 40 Ω	-	46	75	nS
tf	Turn off fall time	Inductive Load	-	140	280	nS
Eon	Turn on Switching Loss		-	80	-	uJ
Eoff	Turn off Switching Loss		-	100	-	uJ
Ets	Total Switching Loss		-	180	270	uJ
Tsc	Short Circuit withstand Time	Vcc = 300V, V_{GE} = 15V @Tc = 100℃	10	-	-	uS
Qg	Total Gate Charge	Vcc = 300V	-	24	36	nC
Qge	Gate-Emitter Charge	V_{GE}= 15V	-	7	10	nC
Qgc	Gate-Collector Charge	Ic = 5A	-	8	12	nC

ELECTRICAL CHARACTERISTICS (DIODE PART)
(T_C=25℃,Unless Otherwise Specified)

Symbol	Characteristics	Test Conditions		Min	Typ	Max	Units
V_{FM}	Diode Forward Voltage	I_F=8.0A	Tc =25℃	-	1.4	1.7	V
			Tc =100℃	-	1.3	-	
Trr	Diode Reverse Recovery Time	I_F=8.0A, V_R=200V -di/dt=200A/uS	Tc =25℃	-	37	55	nS
			Tc =100℃	-	55	-	
Irr	Diode Peak Reverse Recovery Current		Tc =25℃	-	3.5	5.0	A
			Tc =100℃	-	4.5	-	
Qrr	Diode Reverse Recovery Charge		Tc =25℃	-	65	138	nC
			Tc =100℃	-	124	-	

THERMAL RESISTANCE

Symbol	Characteristics	Min	Typ	Max	Units
$R_\theta JC$	Junction-to-Case (IGBT)	-	-	2.0	℃/W
$R_\theta JC$	Junction-to-Case (DIODE)	-	-	3.5	℃/W
$R_\theta JA$	Junction-to-Ambient	-	-	80	℃/W
$R_\theta CS$	Case-to-Sink	-	0.5	-	℃/W

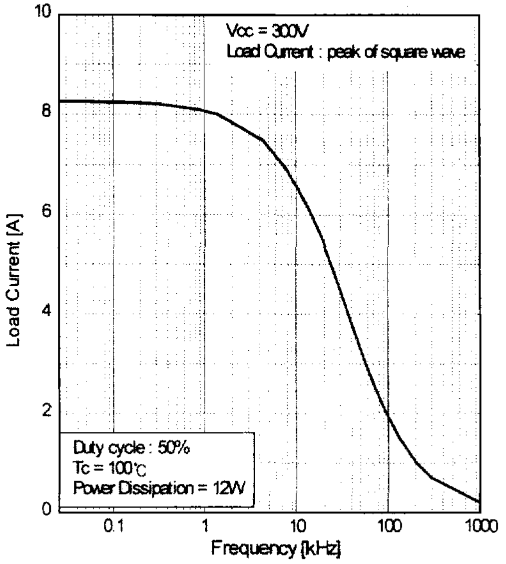


Fig.1 Typical Load Current vs. Frequency

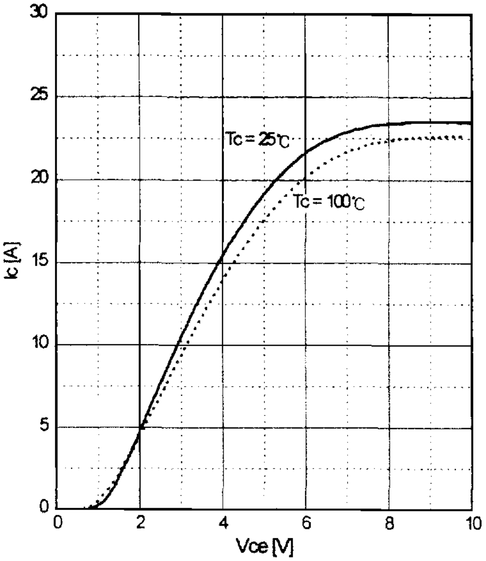


Fig.2 Typical Output Characteristics

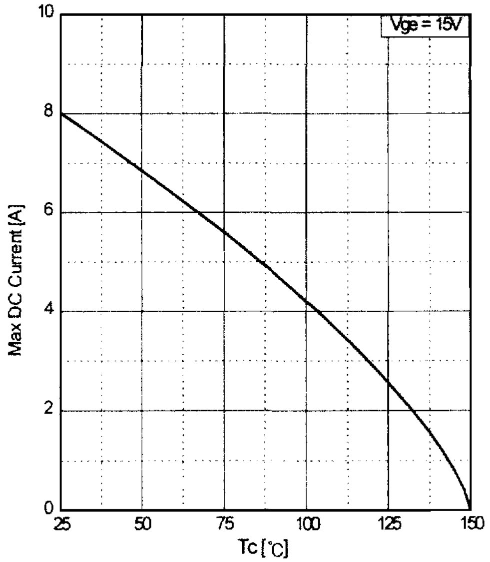


Fig.3 Maximum Collector Current vs. Case Temperature

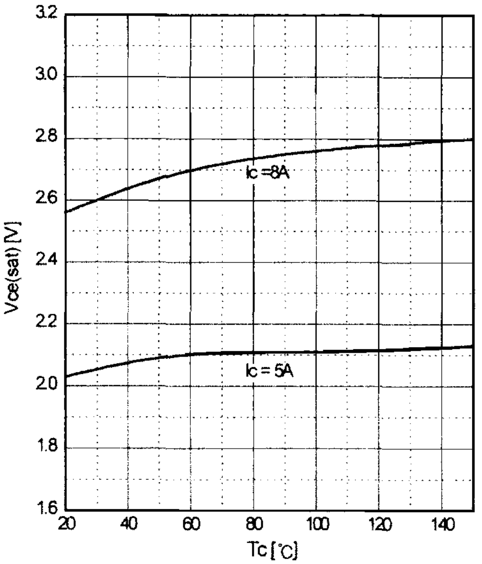


Fig.4 Collector to Emitter Voltage vs. Case Temperature

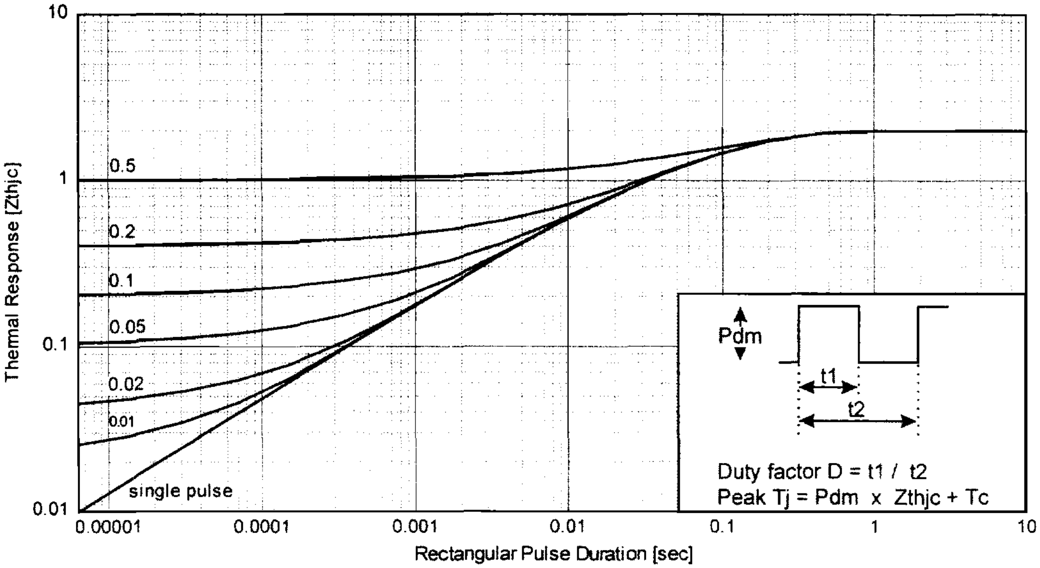
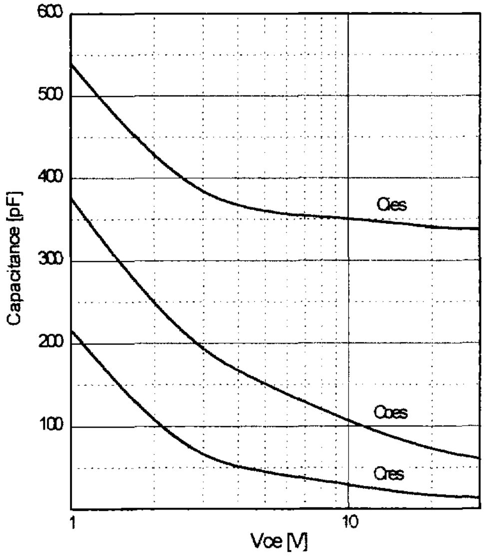


Fig.5 Maximum Effective Transient Thermal Impedance, Junction to Case



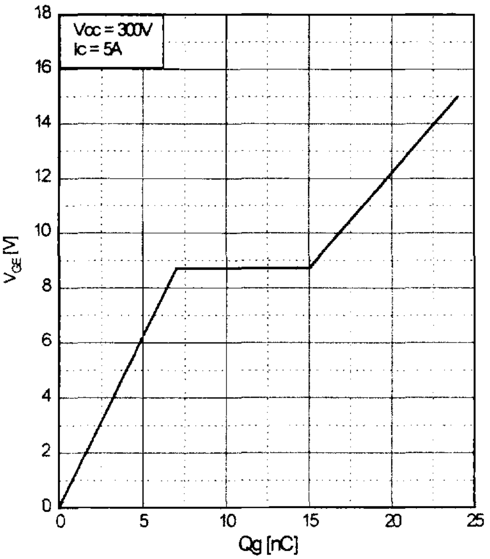


Fig.6 Typical Capacitance vs.
Collector to Emitter Voltage

Fig.7 Typical Gate Charge vs.
Gate to Emitter Voltage

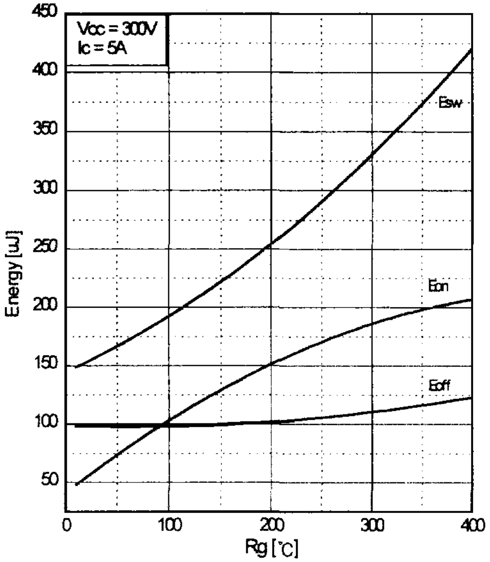


Fig.8 Typical Switching Loss vs. Gate Resistance

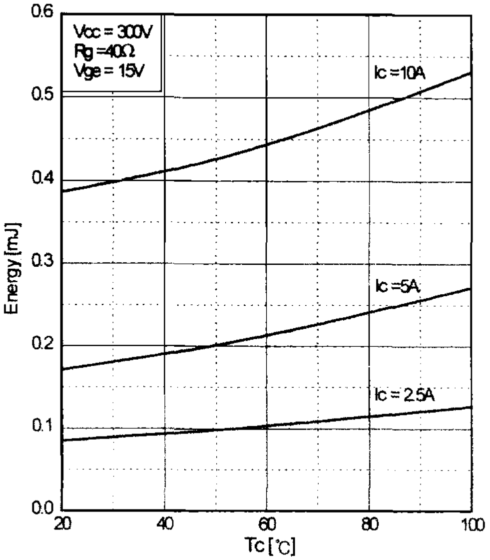


Fig.9 Typical Switching Loss vs. Case Temperature

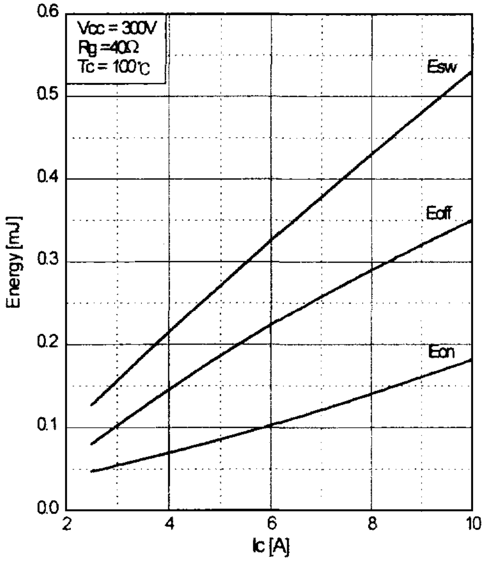


Fig.10 Typical Switching loss vs. Collector to Emitter Current

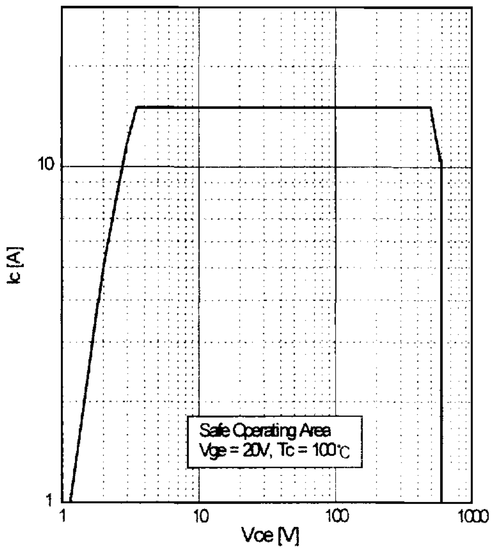


Fig.11 Turn-off SOA

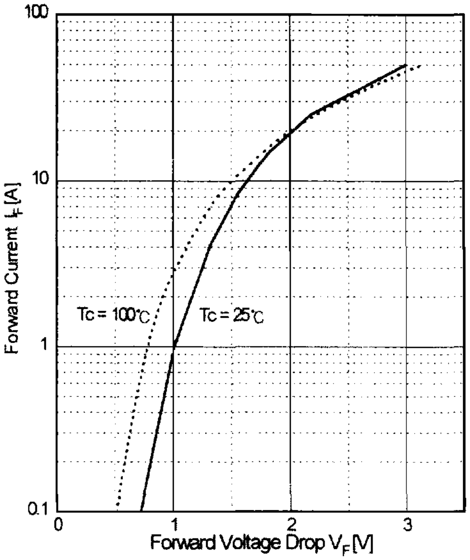


Fig.12 Typical Forward Voltage Drop vs. Forward Current

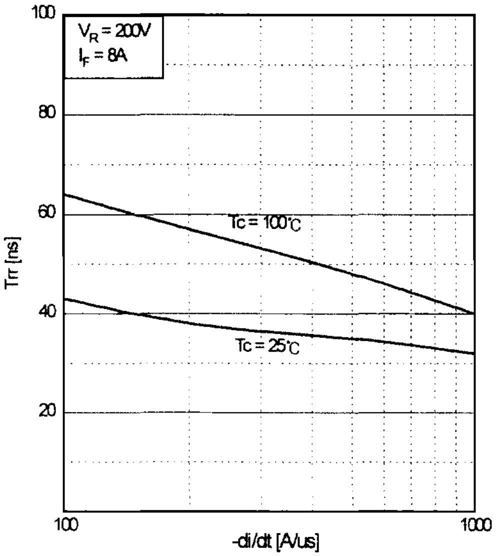


Fig.13 Typical Reverse Recovery Time vs. di/dt

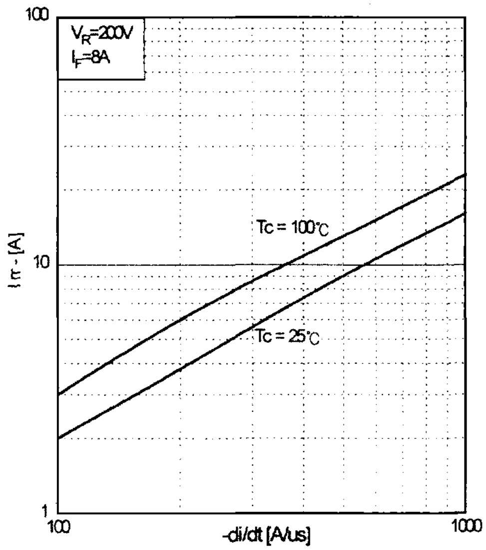


Fig.14 Typical Reverse Recovery Current vs. di/dt

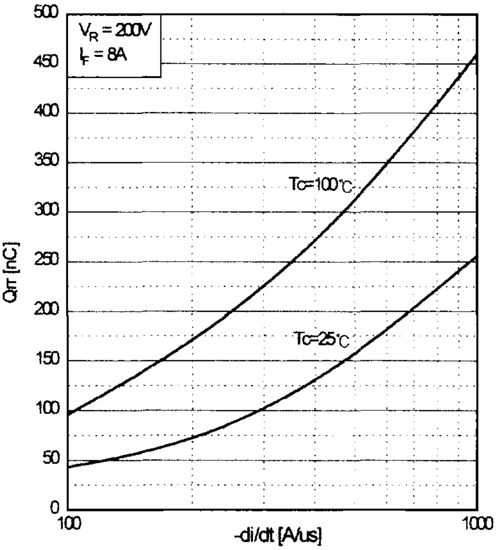


Fig.15 Typical Stored Charge vs. di/dt