

FMG2G50US120

Molding Type Module

General Description

Fairchild IGBT Power Module provides low conduction and switching losses as well as short circuit ruggedness. It's designed for the applications such as motor control, uninterrupted power supplies (UPS) and general inverters where short-circuit ruggedness is required.

Features

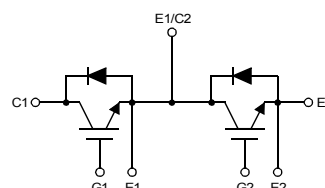
- Short Circuit Rated Time; 10us @ $T_C = 100^\circ\text{C}$, $V_{GE} = 15\text{V}$
- High Speed Switching
- Low Saturation Voltage : $V_{CE(sat)} = 2.6\text{V}$ @ $I_C = 50\text{A}$
- High Input Impedance
- Fast & Soft Anti-Parallel FWD
- UL Certified No.E209204

Application

- AC & DC Motor Controls
- General Purpose Inverters
- Weldings
- Servo Controls
- UPS



Package Code : 7PM-GA



Internal Circuit Diagram

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Description	FMG2G50US120	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current	50	A
$I_{CM(1)}$	Pulsed Collector Current	100	A
I_F	Diode Continuous Forward Current	50	A
I_{FM}	Diode Maximum Forward Current	100	A
P_D	Maximum Power Dissipation	320	W
T_{SC}	Short Circuit Withstand Time @ $T_C = 100^\circ\text{C}$	10	us
T_J	Operating Junction Temperature	-40 to +150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-40 to +125	$^\circ\text{C}$
V_{ISO}	Isolation Voltage @ AC 1minute	2500	V
Mounting Torque	Power Terminal Screw : M5	4.0	N.m
	Mounting Screw : M5	4.0	N.m

Notes :

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

Electrical Characteristics of IGBT $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV_{CES}	Collector-Emitter Breakdown Voltage	$V_{GE} = 0V, I_C = 3mA$	1200	--	--	V
$\Delta BV_{CES} / \Delta T_J$	Temperature Coeff. of Breakdown Voltage	$V_{GE} = 0V, I_C = 1mA$	--	0.6	--	V/ $^\circ\text{C}$
I_{CES}	Collector Cut-Off Current	$V_{CE} = V_{CES}, V_{GE} = 0V$	--	--	3	mA
I_{GES}	Gate - Emitter Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0V$	--	--	± 100	nA

On Characteristics

$V_{GE(th)}$	Gate - Emitter Threshold Voltage	$I_C = 50mA, V_{CE} = V_{GE}$	5.0	7.0	8.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C = 50A, V_{GE} = 15V$	--	2.6	3.0	V

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 600V, I_C = 50A,$ $R_G = 10\Omega, V_{GE} = 15V,$ Inductive Load, $T_C = 25^\circ\text{C}$	--	180	--	ns
t_r	Rise Time		--	80	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	400	--	ns
t_f	Fall Time		--	65	150	ns
E_{on}	Turn-On Switching Loss		--	4.68	--	mJ
E_{off}	Turn-Off Switching Loss	$V_{CC} = 600V, I_C = 50A,$ $R_G = 10\Omega, V_{GE} = 15V,$ Inductive Load, $T_C = 125^\circ\text{C}$	--	3.48	--	mJ
$t_{d(on)}$	Turn-On Delay Time		--	175	--	ns
t_r	Rise Time		--	75	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	390	--	ns
t_f	Fall Time		--	120	--	ns
E_{on}	Turn-On Switching Loss	$V_{CC} = 600V, V_{GE} = 15V$ @ $T_C = 100^\circ\text{C}$	--	5.6	--	mJ
E_{off}	Turn-Off Switching Loss		--	4.4	--	mJ
T_{sc}	Short Circuit Withstand Time	$V_{CC} = 600V, V_{GE} = 15V$ @ $T_C = 100^\circ\text{C}$	10	--	--	us
Q_g	Total Gate Charge	$V_{CE} = 300V, I_C = 50A,$ $V_{GE} = 15V$	--	400	--	nC
Q_{ge}	Gate-Emitter Charge		--	60	--	nC
Q_{gc}	Gate-Collector Charge		--	210	--	nC

Electrical Characteristics of DIODE $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V _{FM}	Diode Forward Voltage	I _F = 50A	T _C = 25°C	--	2.3	3.0	V
			T _C = 125°C	--	2.2	--	
t _{rr}	Diode Reverse Recovery Time	I _F = 50A di / dt = 700 A/us	T _C = 25°C	--	160	--	ns
			T _C = 125°C	--	220	--	
I _{rr}	Diode Peak Reverse Recovery Current		T _C = 25°C	--	29	--	A
			T _C = 125°C	--	36	--	
Q _{rr}	Diode Reverse Recovery Charge		T _C = 25°C	--	2320	--	nC
			T _C = 125°C	--	3960	--	

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (IGBT Part, per 1/2 Module)	--	0.39	$^\circ\text{C/W}$
$R_{\theta JC}$	Junction-to-Case (DIODE Part, per 1/2 Module)	--	0.47	$^\circ\text{C/W}$
$R_{\theta JC}$	Case-to-Sink (Conductive grease applied)	0.035	--	$^\circ\text{C/W}$
Weight	Weight of Module	240	--	g

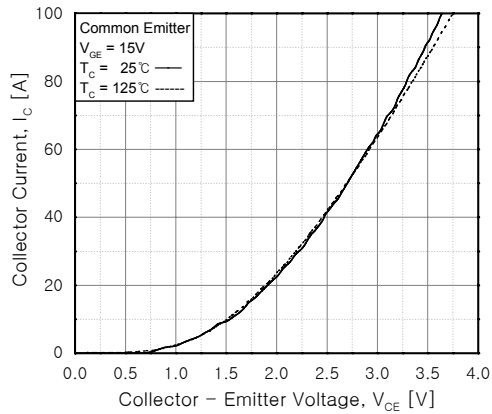


Fig 1. Typical Output Characteristics

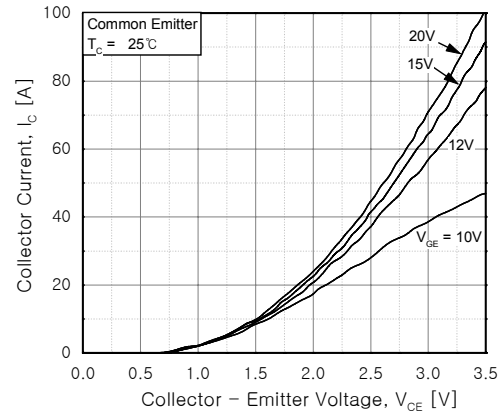


Fig 2. Typical Saturation Voltage Characteristics

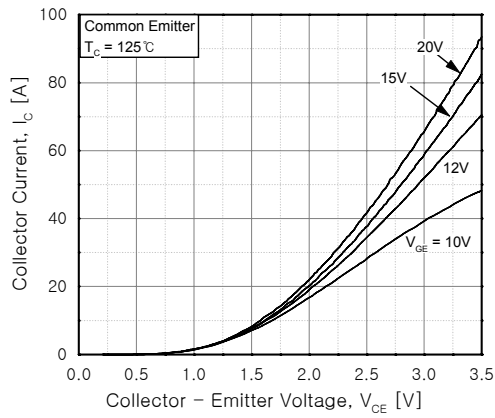


Fig 3. Typical Saturation Voltage Characteristics

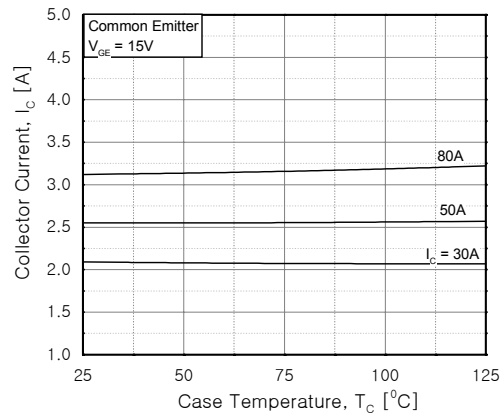


Fig 4. Saturation Voltage vs. Case Temperature at Variant Current Level

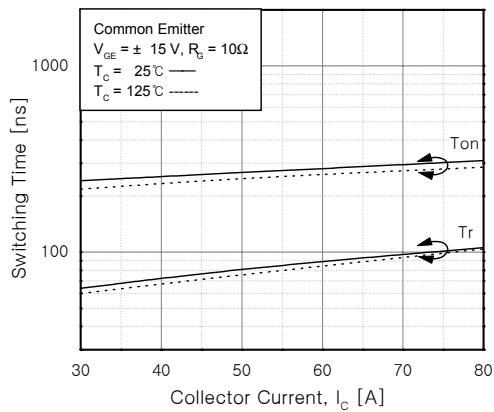


Fig 5. Turn-On Characteristics vs. Collector Current

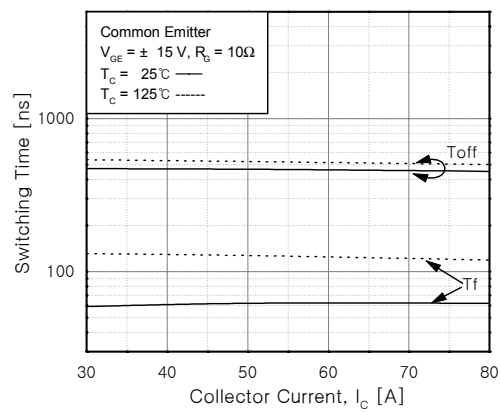


Fig 6. Turn-Off Characteristics vs. Collector Current

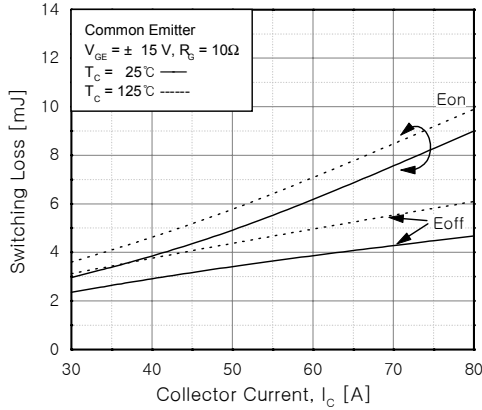


Fig 7. Switching Loss vs. Collector Current

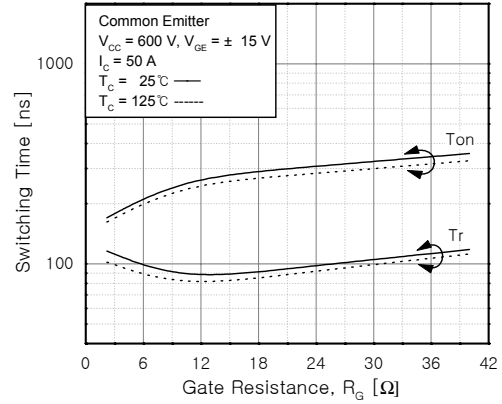


Fig 8. Turn-on Characteristics vs. Gate Resistance

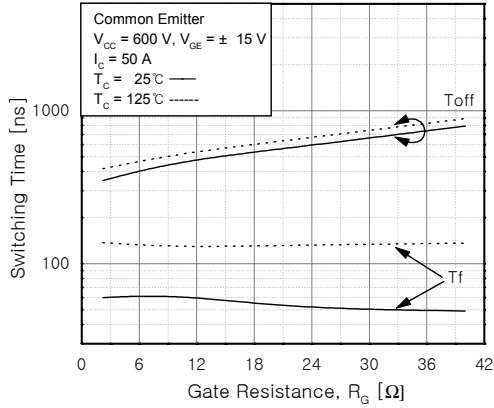


Fig 9. Turn-Off Characteristics vs. Gate Resistance

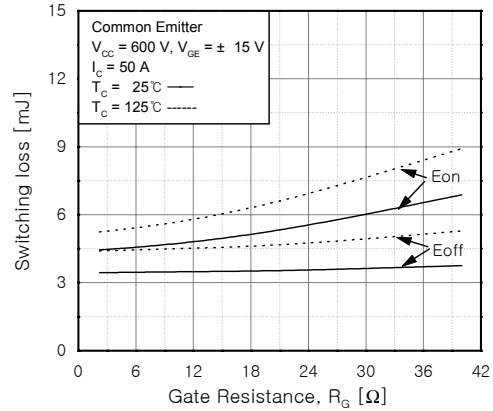


Fig 10. Switching Loss vs. Gate Resistance

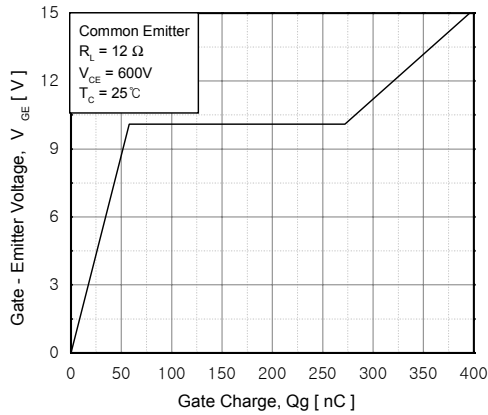


Fig 11. Gate Charge Characteristics

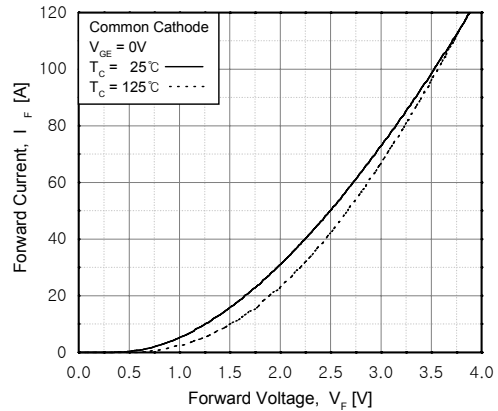


Fig 12. Forward Characteristics(diode)

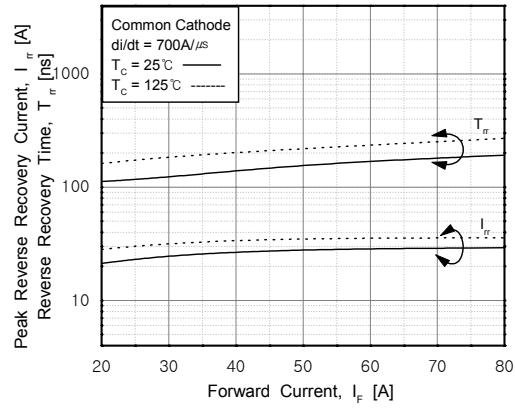


Fig 13. Reverse Recovery Characteristics(diode)

Dimensions in Millimeters

FMG2G50US120

Technical drawing showing the front and side views of a rectangular electronic component with dimensions and labels.

Front View Dimensions:

- Overall width: 93 ± 0.5
- Overall height: 35 ± 0.6
- Top edge features:
 - Left corner: $2 - \varnothing 5.4 \pm 0.3$
 - Between C2E1 and E2: 23 ± 0.5
 - Between E2 and C1: 23 ± 0.5
 - Between C1 and G2: 40 ± 0.5
 - Right edge: 4 ± 0.6
- Internal features:
 - Mounting holes: $3 - M5$
 - Labels: C2E1, E2, C1, G2, E2, E1, G1
 - Internal vertical spacing: 12 ± 0.6 and 17 ± 0.6
 - Bottom edge: 4 ± 0.6

Side View Dimensions:

- Overall width: 90 ± 0.5
- Overall height: $31.8 - 0.6$
- Top edge features:
 - Between mounting holes: 16 ± 0.5
 - Mounting hole diameter: 10 ± 0.5
 - Right edge: 7.7 ± 0.5
- Internal features:
 - Internal height: $22.3 - 0.6$
 - Internal width: 28.1 ± 0.5
 - Bottom edge: 32 ± 0.5

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