

FAIRCHILD
SEMICONDUCTOR®

IGBT

FMG2G400LS60

Molding Type Module

General Description

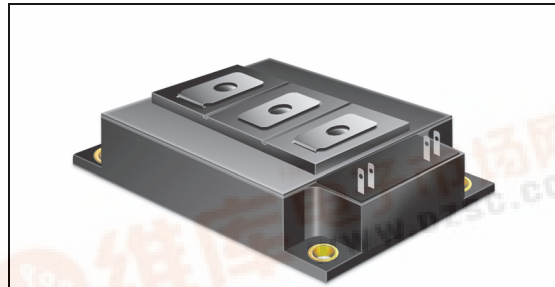
Fairchild IGBT Power Module provides low conduction as well as short circuit ruggedness. It's designed for the applications such as welder.

Features

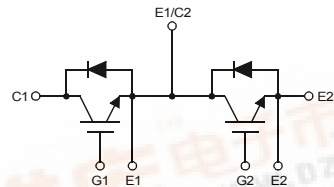
- Short Circuit Rated Time; 10us @ $T_C = 100^\circ\text{C}$, $V_{GE} = 15\text{V}$
- Low Saturation Voltage : $V_{CE(sat)} = 1.4\text{V}$ @ $I_C = 400\text{A}$
- High Input Impedance
- Fast & Soft Anti-Parallel FWD
- UL Certified No.E209204

Application

- AC/ DC Welder



Package Code : 7PM-IA



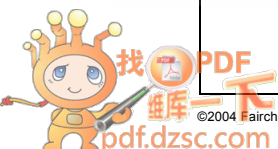
Internal Circuit Diagram

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

Symbol	Description	FMG2G400LS60	Units
V_{CES}	Collector-Emitter Voltage	600	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current	400	A
$I_{CM(1)}$	Pulsed Collector Current	800	A
I_F	Diode Continuous Forward Current	400	A
I_{FM}	Diode Maximum Forward Current	800	A
P_D	Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$	1136	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 : M6	4.0	N.m
	Mounting Screw : M6	4.0	N.m

Notes :

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



Electrical Characteristics of IGBTT_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
V _{V_{CES}}	Collector-Emitter Breakdown Voltage	V _{GE} = 0V, I _C = 250μA	600	--	--	V
ΔB _{V_{CES}} /ΔT _J	Temperature Coeff. of Breakdown Voltage	V _{GE} = 0V, I _C = 1mA	--	0.6	--	V/°C
I _{CES}	Collector Cut-Off Current	V _{CE} = V _{CES} , V _{GE} = 0V	--	--	250	μA
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 = 400mA, V _{CE} = V _{GE}	5.0	6.5	8.5	V
V _{CE(sat)}	Collector to Emitter Saturation Voltage	I _C = 400A, V _{GE} = 15V	--	1.4	1.8	V

Switching Characteristics

t _{d(on)}	Turn-On Delay Time	V _{CC} = 300 V, I _C = 400A, R _G = 10Ω, V _{GE} = 15V, Inductive Load, T _C = 25°C	--	0.33	--	us
t _r	Rise Time		--	0.3	--	us
t _{d(off)}	Turn-Off Delay Time		--	0.52	--	us
t _f	Fall Time		--	2.3	--	us
E _{on}	Turn-On Switching Loss		--	19.5	--	mJ
E _{off}	Turn-Off Switching Loss		--	230	--	mJ
t _{d(on)}	Turn-On Delay Time	V _{CC} = 300 V, I _C = 400A, R _G = 10Ω, V _{GE} = 15V, Inductive Load, T _C = 125°C	--	0.41	--	us
t _r	Rise Time		--	0.33	--	us
t _{d(off)}	Turn-Off Delay Time		--	0.62	--	us
t _f	Fall Time		--	23	--	us
E _{on}	Turn-On Switching Loss		--	320	--	mJ
E _{off}	Turn-Off Switching Loss		--	--	--	mJ
T _{sc}	Short Circuit Withstand Time	V _{CC} = 300 V, V _{GE} = 15V @ T _C = 100°C	10	--	--	us
Q _g	Total Gate Charge	V _{CE} = 300 V, I _C = 400A, V _{GE} = 15V	--	1200	--	nC
Q _{ge}	Gate-Emitter Charge		--	310	--	nC
Q _{gc}	Gate-Collector Charge		--	490	--	nC

Electrical Characteristics of DIODET_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units	
V _{FM}	Diode Forward Voltage	I _F = 400A	T _C = 25°C	--	1.9	2.8	V
			T _C = 100°C	--	1.8	--	
t _{rr}	Diode Reverse Recovery Time	I _F = 400A di / dt = 800 A/us	T _C = 25°C	--	90	130	ns
			T _C = 100°C	--	130	--	
I _{rr}	Diode Peak Reverse Recovery Current		T _C = 25°C	--	35	46	A
			T _C = 100°C	--	76	--	
Q _{rr}	Diode Reverse Recovery Charge		T _C = 25°C	--	1580	3000	nC
			T _C = 100°C	--	4940	--	

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
R _{θJC}	Junction-to-Case (IGBT Part, per 1/2 Module)	--	0.11	°C/W
R _{θJC}	Junction-to-Case (DIODE Part, per 1/2 Module)	--	0.18	°C/W
R _{θJC}	Case-to-Sink (Conductive grease applied)	0.03	--	°C/W
Weight	Weight of Module	360	--	g

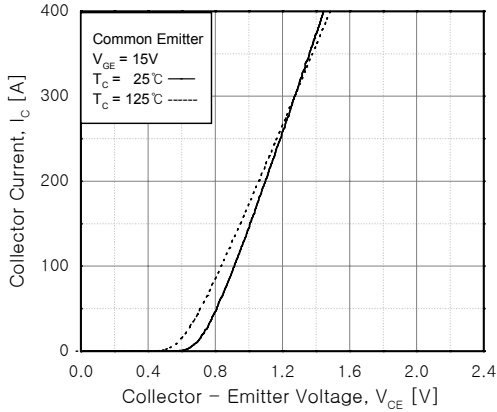


Fig 1. Typical Output Characteristics

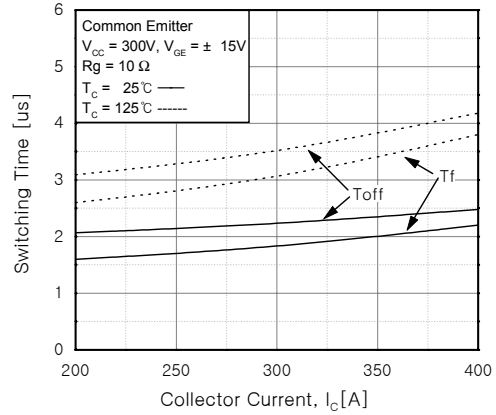


Fig 2. Turn-Off Characteristics vs. Collector Current

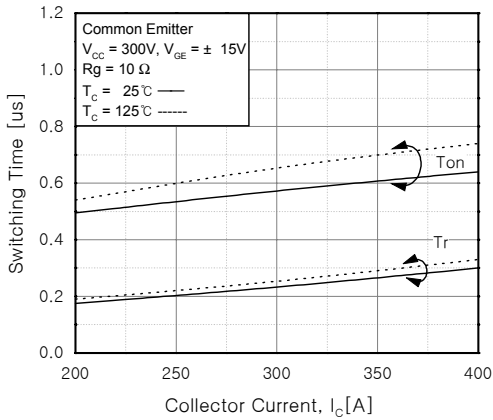


Fig 3. Turn-On Characteristics vs. Collector Current

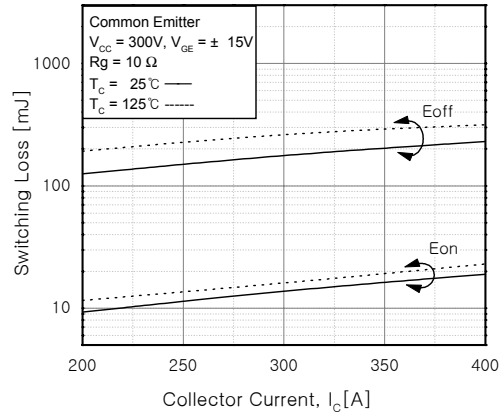


Fig 4. Switching Loss vs. Collector Current

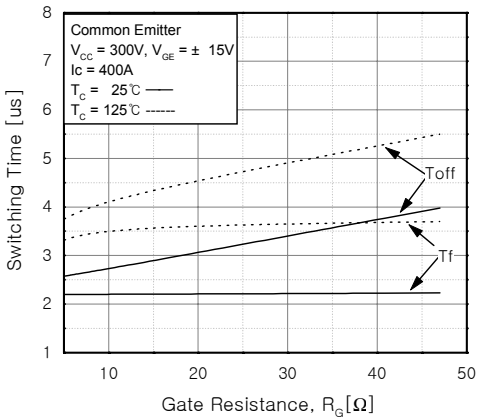


Fig 5. Turn-Off Characteristics vs. Gate Resistance

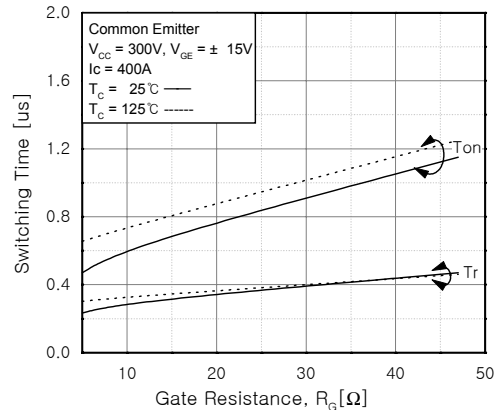


Fig 6. Turn-On Characteristics vs. Gate Resistance

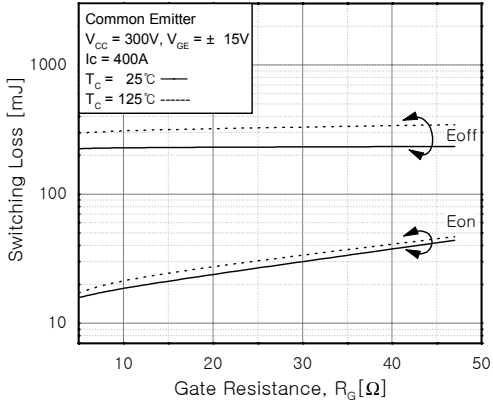


Fig 7. Switching Loss vs. Gate Resistance

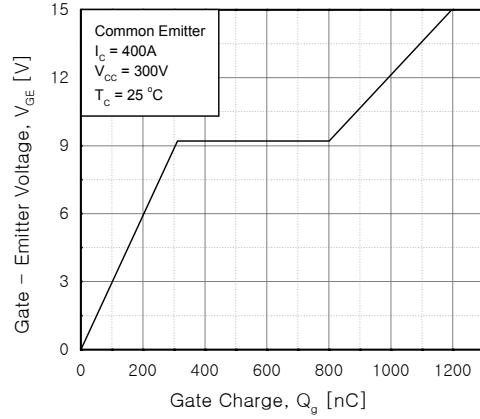


Fig 8. Gate Charge Characteristics

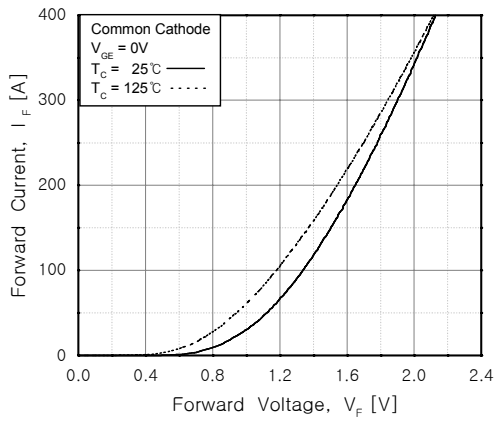


Fig 9. Forward Characteristics (diode)

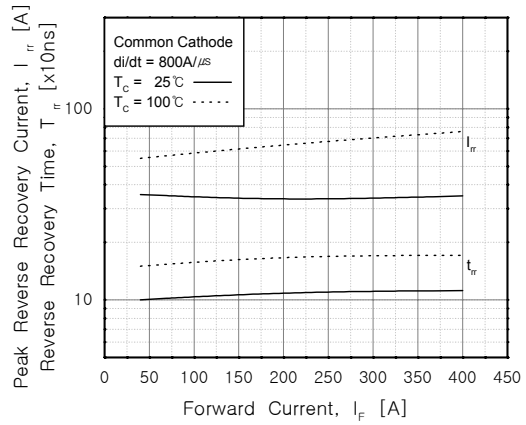
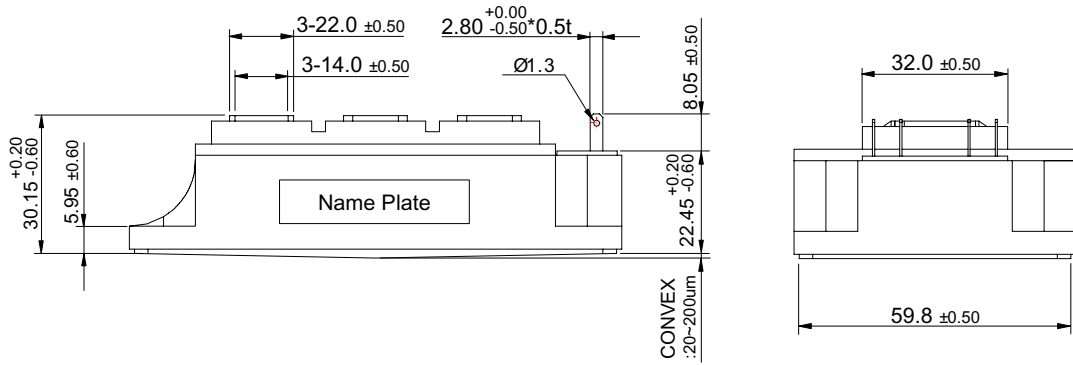
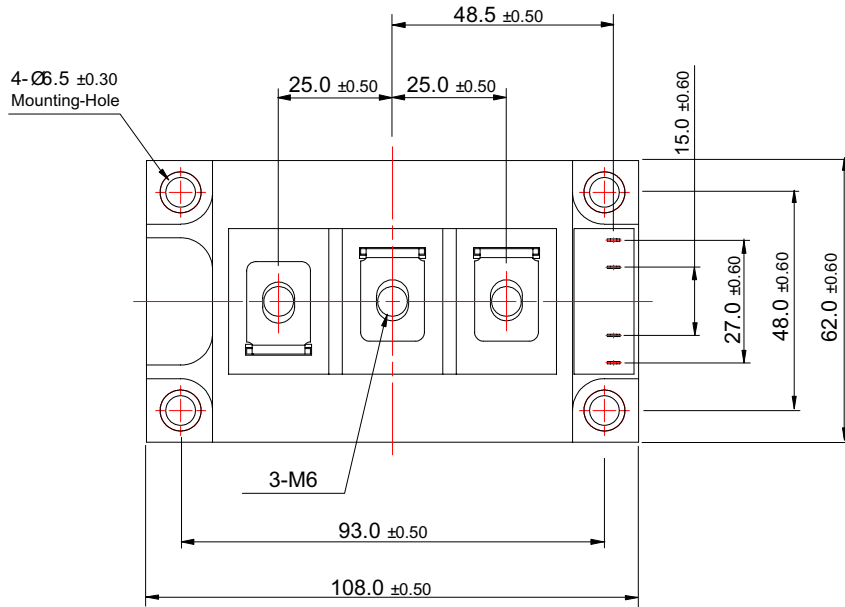


Fig 10. Reverse Recovery Characteristics(diode)

Package Dimension

7PM-IA



Dimensions in Millimeters

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