

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

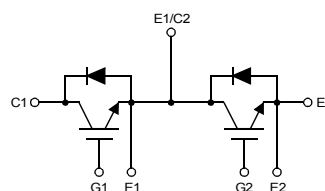
- Short Circuit Rated Time; 10us @ $T_C = 100^\circ\text{C}$, $V_{GE} = 15\text{V}$
- Low Saturation Voltage : $V_{CE(sat)} = 1.4\text{ V @ } I_C = 400\text{A}$
- High Input Impedance
- Fast & Soft Anti-Parallel FWD
- UL Certified No.E209204

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 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	$V_{GE} = 0V, I_C = 250\mu A$	600	--	--	V
$\Delta BV_{CES} / \Delta T_J$	Temperature Coeff. of Breakdown Voltage	$V_{GE} = 0V, I_C = 1mA$	--	0.6	--	$V/^\circ C$
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	$V_{CC} = 300V, I_C = 400A,$ $R_G = 10\Omega, V_{GE} = 15V,$ Inductive Load, $T_C = 25^\circ C$	--	0.33	--	μs
t_r	Rise Time		--	0.3	--	μs
$t_{d(off)}$	Turn-Off Delay Time		--	0.52	--	μs
t_f	Fall Time		--	2.3	--	μs
E_{on}	Turn-On Switching Loss		--	19.5	--	mJ
E_{off}	Turn-Off Switching Loss	$V_{CC} = 300V, I_C = 400A,$ $R_G = 10\Omega, V_{GE} = 15V,$ Inductive Load, $T_C = 125^\circ C$	--	230	--	mJ
$t_{d(on)}$	Turn-On Delay Time		--	0.41	--	μs
t_r	Rise Time		--	0.33	--	μs
$t_{d(off)}$	Turn-Off Delay Time		--	0.62	--	μs
t_f	Fall Time		--	23	--	μs
E_{on}	Turn-On Switching Loss	$V_{CC} = 300V, V_{GE} = 15V$ @ $T_C = 100^\circ C$	10		--	μs
E_{off}	Turn-Off Switching Loss		--		--	mJ
T_{sc}	Short Circuit Withstand Time		--	1200	--	nC
Q_g	Total Gate Charge	$V_{CE} = 300V, I_C = 400A,$ $V_{GE} = 15V$	--	310	--	nC
Q_{ge}	Gate-Emitter Charge		--	490	--	nC
Q_{gc}	Gate-Collector Charge		--		--	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 = 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
$R_{\theta JC}$	Junction-to-Case (IGBT Part, per 1/2 Module)	--	0.11	$^\circ C/W$
$R_{\theta JC}$	Junction-to-Case (DIODE Part, per 1/2 Module)	--	0.18	$^\circ C/W$
$R_{\theta JC}$	Case-to-Sink (Conductive grease applied)	0.03	--	$^\circ C/W$
Weight	Weight of Module	360	--	g

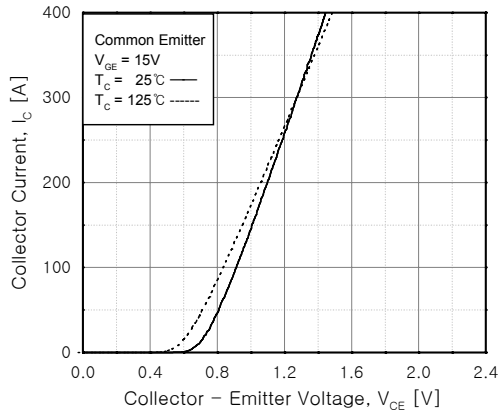


Fig 1. Typical Output Characteristics

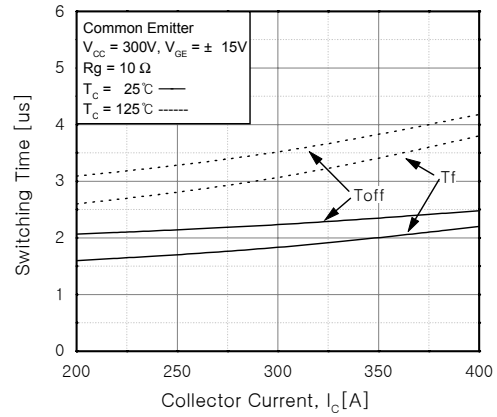


Fig 2. Turn-Off Characteristics vs. Collector Current

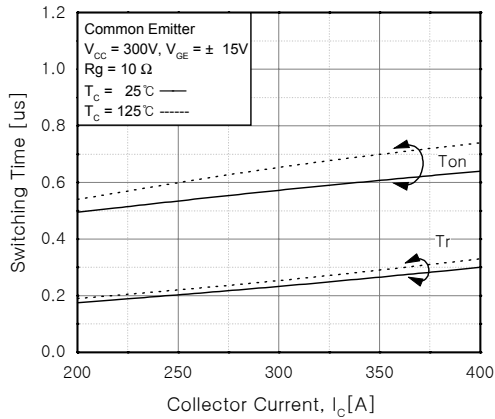


Fig 3. Turn-On Characteristics vs. Collector Current

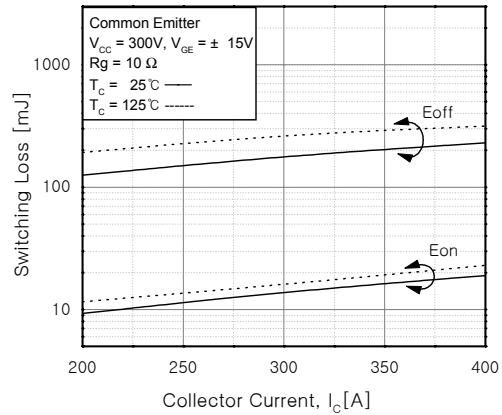


Fig 4. Switching Loss vs. Collector Current

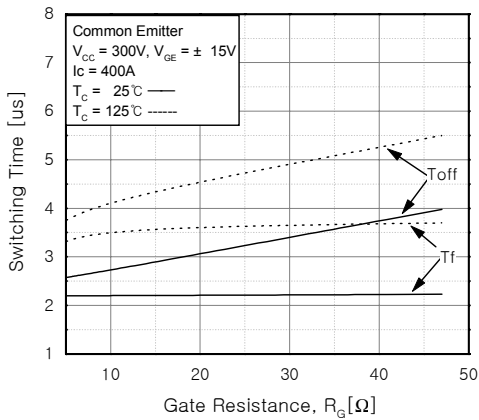


Fig 5. Turn-Off Characteristics vs. Gate Resistance

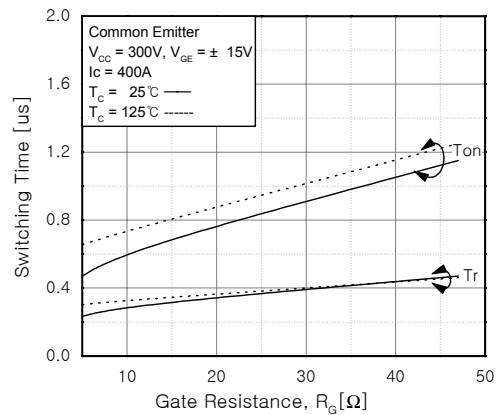


Fig 6. Turn-On Characteristics vs. Gate Resistance

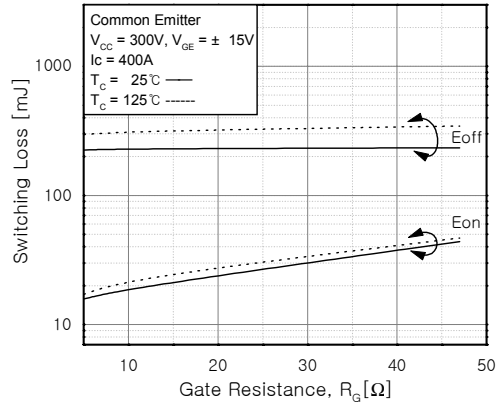


Fig 7. Switching Loss vs. Gate Resistance

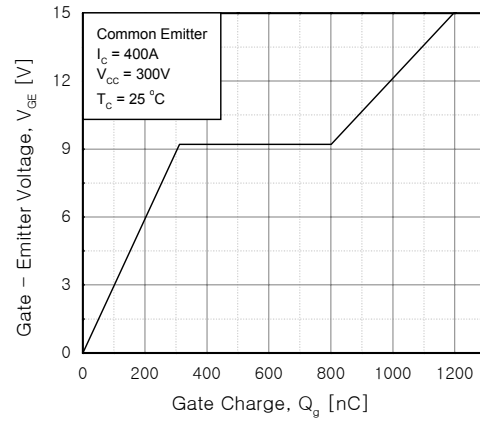


Fig 8. Gate Charge Characteristics

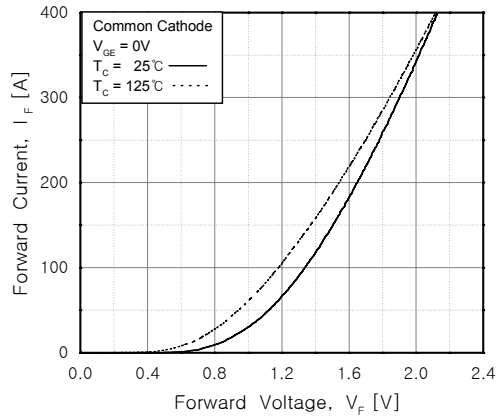


Fig 9. Forward Characteristics (diode)

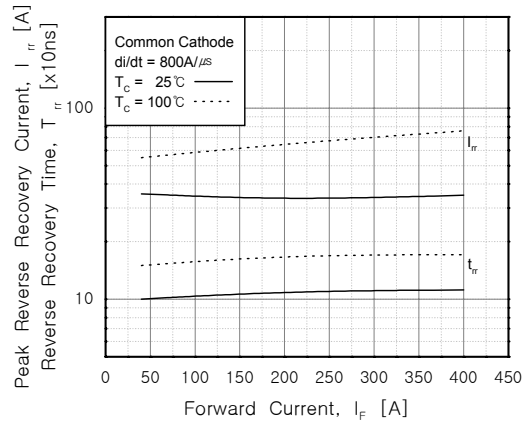
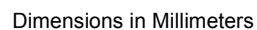


Fig 10. Reverse Recovery Characteristics (diode)

FMG2G400LS60

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