

February 2016

Features

- Maximum Junction Temperature : T_J = 175°C
- Positive Temperaure Co-efficient for Easy Parallel Operating
- High Current Capability
- Low Saturation Voltage: $V_{CE(sat)} = 1.4 \text{ V} (\text{Typ.}) @ I_C = 40 \text{ A}$
- 100% of the Parts tested for I_{LM}(1)
- High Input Impedance
- Tighten Parameter Distribution
- RoHS Compliant





Using Fairchild's proprietary trench design and advanced field

stop IGBT technology, 650V field stop offers superior conduction and switching performance and easy parallel operation.

This device is well suited for the resonant or soft switching appli-

General Description

Applications

Induction Heating, MWO

cation such as induction heating and MWO.

Absolute Maximum Ratings

Symbol	Description		FGA40S65SH	Unit
V _{CES}	Collector to Emitter Voltage		650	V
V _{GES}	Gate to Emitter Voltage		± 20	V
	Transient Gate to Emitter Voltage		\pm 30	V
	Collector Current	@ T _C = 25 ^o C	80	A
10	Collector Current	@ T _C = 100°C	40	A
I _{LM} (1)	Pulsed Collector Current	@ T _C = 25°C	120	A
I _{CM} (2)	Pulsed Collector Current		120	A
1_	Diode Forward Current	@ T _C = 25°C	40	A
·F	Diode Forward Current @ $T_{C} = 100^{\circ}C$		20	A
I _{FM}	Pulsed Diode Maximum Forward Curr	rent	240	A
Pa	Maximum Power Dissipation	@ T _C = 25°C	268	W
· D	Maximum Power Dissipation	@ T _C = 100°C	134	W
TJ	Operating Junction Temperature		-55 to +175	°C
T _{stg}	Storage Temperature Range		-55 to +175	°C
ΤL	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds		300	°C

Thermal Characteristics

Symbol	Parameter	FGA40S65SH	Unit	
$R_{\theta JC}$ (IGBT)	Thermal Resistance, Junction to Case, Max.	0.56	°C/W	
R_{\thetaJA}	Thermal Resistance, Junction to Ambient, Max.	40	°C/W	

Notes:

1. V_{CC} = 400 V, V_{GE} = 15 V, I_C = 120 A, R_G = 35 Ω , Inductive Load 2. Repetitive rating: Pulse width limited by max. junction temperature

Device MarkingDeviceFGA40S65SHFGA40S65SH		Device	Package	Reel Size	Таре	Width	Qty per Tube	
		TO-3PN -			-		30	
Electric	al Char	acteristics of the I	GBT T _C = 25°	°C unless otherwise noted				
Symbol	Parameter		Test Conditions		Min.	Тур.	Max.	Unit
Off Charac	teristics							
BV _{CES}	Collector	Collector to Emitter Breakdown Voltage		V _{GE} = 0 V, I _C = 1 mA		-	-	V
ΔΒV _{CES} / ΔΤ _J	Temperature Coefficient of Breakdown Voltage		$V_{GE} = 0 V, I_{C} = 1 mA$		-	0.65	-	V/ºC
ICES	Collector Cut-Off Current		$V_{CE} = V_{CES}, V_{GE} = 0 V$		-	-	250	μA
I _{GES}	G-E Leak	age Current	$V_{GE} = V_{GES},$	$V_{GE} = V_{GES}, V_{CE} = 0 V$		-	± 400	nA
On Charac	teristics							
V _{GE(th)}	G-E Three	shold Voltage	I _C = 40 mA, \	$I_{C} = 40 \text{ mA}, V_{CE} = V_{CE}$		5.3	7.5	V
			$I_{C} = 40 \text{ A}, V_{GE} = 15 \text{ V}$		-	1.40	1.81	V
V _{CE(sat)}	Collector to Emitter Saturation Voltage		I _C = 40 A, V _G T _C = 175°C	$I_{C} = 40 \text{ A}, V_{GE} = 15 \text{ V},$ $T_{C} = 175^{\circ}\text{C}$		1.65	-	V
			$I_F = 20 \text{ A}, T_C = 25^{\circ}\text{C}$		-	1.45	1.95	V
V _{FM}	Diode For	Diode Forward Voltage		$I_{\rm F} = 20$ A, $T_{\rm C} = 175^{\rm o}$ C		1.65	-	V
Dynamic C C _{ies}	haracteristics Input Capacitance Output Capacitance				-	2012	-	pF
C _{oes}			$V_{CE} = 30 V_{,} V_{,}$	$V_{CE} = 30 V_{V}_{GE} = 0 V_{H}$		49	-	pF
C _{res}	Reverse 7	Fransfer Capacitance			-	26	-	pF
Switching	Characteri	stics						
T _{d(on)}	Turn-On [Delay Time			-	19.2	-	ns
T _r	Rise Time)				65.6	-	ns
T _{d(off)}	Turn-Off	Delay Time	V _{CC} = 400 V,	I _C = 40 A,		68.8	-	ns
T _f	Fall Time		$R_G = 6 \Omega$, $V_{GE} = 15$	$_{\rm HE} = 15 \text{V},$	-	96.8	-	ns
E _{on}	Turn-On S	Switching Loss	Resistive Loa	ad, $T_{\rm C} = 25^{\circ}{\rm C}$	-	194	-	uJ
E _{off}	Turn-Off S	Switching Loss			-	388	-	uJ
E _{ts}	Total Swit	ching Loss			-	592	-	uJ
T _{d(on)}	Turn-On [Delay Time			-	19.2	-	ns
T _r	Rise Time				-	87.2	-	ns
T _{d(off)}	Turn-Off	Delay Time	V _{CC} = 400 V,	I _C = 40 A,	-	75.2	-	ns
T _f	Fall Time		$R_G = 6 \Omega, V_G$	$_{BE} = 15 \text{ V},$ d. To = 175°C	-	158	-	ns
E _{on}	Turn-On S	Switching Loss	ResistiveL0a	a, 10 - 175 C	-	292	-	uJ
E _{off}	Turn-Off S	Switching Loss			-	633	-	uJ
E _{ts}	Total Swit	ching Loss			-	925	-	uJ
Qg	Total Gate	e Charge	$V_{} = 400 V_{} = 40 A_{}$		-	73	-	nC
Q _{ge}	Gate to E	mitter Charge	$V_{GE} = 15 V$	· <u> </u>	-	13	-	nC
Q _{ac}	Gate to C	ollector Charge			-	28	- 1	nC

Typical Performance Characteristics

Figure 1. Typical Output Characteristics







Figure 5. Saturation Voltage vs. V_{GE}



Figure 2. Typical Output Characteristics







Figure 6. Saturation Voltage vs. V_{GE}











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