SGH80N60UFD

Ultrafast IGBT

General Description

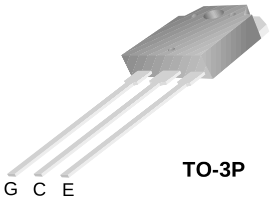
Fairchild's UFD series of Insulated Gate Bipolar Transistors (IGBTs) provides low conduction and switching losses. The UFD series is designed for applications such as motor control and general inverters where high speed switching is a required feature.

Features

- High speed switching
- Low saturation voltage : $V_{CE(sat)} = 2.1$ V @ $I_C = 40$A
- High input impedance
- CO-PAK, IGBT with FRD : $t_{rr} = 50$ns (typ.)

Applications

AC & DC motor controls, general purpose inverters, robotics, and servo controls.



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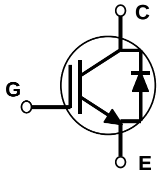

Absolute Maximum Ratings

$T_C = 25°C$ unless otherwise noted

Symbol	Description	SGH80N60UFD	Units
V_{CES}	Collector-Emitter Voltage	600	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ T_C = 25°C	80	A
	Collector Current @ T_C = 100°C	40	A
$I_{CM\ (1)}$	Pulsed Collector Current	220	A
I_F	Diode Continuous Forward Current @ T_C = 100°C	25	A
I_{FM}	Diode Maximum Forward Current	280	A
P_D	Maximum Power Dissipation @ T_C = 25°C	195	W
	Maximum Power Dissipation @ T_C = 100°C	78	W
T_J	Operating Junction Temperature	-55 to +150	°C
T_{stg}	Storage Temperature Range	-55 to +150	°C
T_L	Maximum Lead Temp. for Soldering Purposes,/8” from Case for 5 Seconds	300	°C

Notes :

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

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$(IGBT)	Thermal Resistance, Junction-to-Case	--	0.64	°C/W
$R_{\theta JC}$(DIODE)	Thermal Resistance, Junction-to-Case	--	0.83	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	40	°C/W

Electrical Characteristics of the IGBT T_C = 25°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 = 250uA	600	--	--	V
$\Delta B_{VCES}/\Delta T_J$	Temperature Coefficient 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	uA
I_{GES}	G-E Leakage Current	V_{GE} = V_{GES}, V_{CE} = 0V	--	--	± 100	nA
On Characteristics						
$V_{GE(th)}$	G-E Threshold Voltage	I_C = 40mA, V_{CE} = V_{GE}	3.5	4.5	6.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C = 40A, V_{GE} = 15V	--	2.1	2.6	V
		I_C = 80A, V_{GE} = 15V	--	2.6	--	V
Dynamic Characteristics						
C_{ies}	Input Capacitance	V_{CE} = 30V, V_{GE} = 0V, f = 1MHz	--	2790	--	pF
C_{oes}	Output Capacitance		--	350	--	pF
C_{res}	Reverse Transfer Capacitance		--	100	--	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{CC} = 300 V, I_C = 40A, R_G = 5Ω, V_{GE} = 15V, Inductive Load, T_C = 25°C	--	23	--	ns
t_r	Rise Time		--	50	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	90	130	ns
t_f	Fall Time		--	50	150	ns
E_{on}	Turn-On Switching Loss		--	570	--	uJ
E_{off}	Turn-Off Switching Loss		--	590	--	uJ
E_{ts}	Total Switching Loss		--	1160	1500	uJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC} = 300 V, I_C = 40A, R_G = 5Ω, V_{GE} = 15V, Inductive Load, T_C = 125°C	--	30	--	ns
t_r	Rise Time		--	55	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	150	200	ns
t_f	Fall Time		--	160	250	ns
E_{on}	Turn-On Switching Loss		--	630	--	uJ
E_{off}	Turn-Off Switching Loss		--	940	--	uJ
E_{ts}	Total Switching Loss		--	1580	2000	uJ
Q_g	Total Gate Charge	V_{CE} = 300 V, I_C = 40A, V_{GE} = 15V	--	175	250	nC
Q_{ge}	Gate-Emitter Charge		--	25	40	nC
Q_{gc}	Gate-Collector Charge		--	60	90	nC
L_e	Internal Emitter Inductance	Measured 5mm from PKG	--	14	--	nH

Electrical Characteristics of DIODE T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_{FM}	Diode Forward Voltage	I_F = 25A	T_C = 25°C	--	1.4	1.7	V
			T_C = 100°C	--	1.3	--	
t_{rr}	Diode Reverse Recovery Time	I_F = 25A, di/dt = 200A/us	T_C = 25°C	--	50	95	ns
			T_C = 100°C	--	105	--	
I_{rr}	Diode Peak Reverse Recovery Current		T_C = 25°C	--	4.5	10	A
			T_C = 100°C	--	8.5	--	
Q_{rr}	Diode Reverse Recovery Charge		T_C = 25°C	--	112	375	nC
			T_C = 100°C	--	420	--	