

IGBT

SGP15N60RUF

Short Circuit Rated IGBT

General Description

Fairchild's Insulated Gate Bipolar Transistor(IGBT) RUF series provides low conduction and switching losses as well as short circuit ruggedness. RUF series is designed for the applications such as motor control, UPS and general inverters where short-circuit ruggedness is required.

Features

- Short Circuit rated 10us @ $T_C = 100$ °C, $V_{GE} = 15$ V
- High Speed Switching
- Low Saturation Voltage : $V_{CE(sat)} = 2.2 \text{ V} @ I_C = 15 \text{A}$
- High Input Impedance

Application

AC & DC Motor controls, General Purpose Inverters, Robotics, Servo Controls





Absolute Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Description		SGP15N60RUF	Units
V _{CES}	Collector-Emitter Voltage		600	V
V _{GES}	Gate-Emitter Voltage		± 20	V
	Collector Current	@ T _C = 25°C	24	А
IC	Collector Current	@ T _C = 100°C	15	А
I _{CM (1)}	Pulsed Collector Current		45	А
	Short Circuit Withstand Time	@ T _C = 100°C	10	us
$\frac{T_{SC}}{P_{D}}$	Maximum Power Dissipation	@ T _C = 25°C	160	W
	Maximum Power Dissipation	@ T _C = 100°C	64	W
TJ	Operating Junction Temperature		-55 to +150	°C
T _{stg}	Storage Temperature Range		-55 to +150	°C
T _L	Maximum Lead Temp. for Soldering Purposes, 1/8" from Case for 5 Seconds		300	°C

Notes

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

Thermal Characteristics

Symbol	Parameter	Тур.	Max.	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case		0.77	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient		62.5	°C/W

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Units
Off Cha	racteristics					
BV _{CES}	Collector-Emitter Breakdown Voltage	$V_{GE} = 0V, I_{C} = 250uA$	600			V
$\Delta B_{VCES}/$ 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	uA
I _{GES}	G-E Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0V$			± 100	nA
On Char	racteristics					
V _{GE(th)}	G-E Threshold Voltage	$I_C = 15$ mA, $V_{CE} = V_{GE}$	5.0	6.0	8.5	V
	Collector to Emitter	$I_C = 15A$, $V_{GE} = 15V$		2.2	2.8	V
$V_{CE(sat)}$	Saturation Voltage	$I_C = 24A$, $V_{GE} = 15V$		2.5		V
Dumami	Characteristics	, GL				
C _{ies}	C Characteristics Input Capacitance		1	948		pF
	Output Capacitance	$V_{CE} = 30V_{,} V_{GE} = 0V_{,}$		101		рF
C _{oes} C _{res}	Reverse Transfer Capacitance	f = 1MHz		33		pF
	ng Characteristics Turn-On Delay Time			17		ns
t _{d(on)}	•					ns
t _r	Rise Time			33		ns
t _{d(off)}	Turn-Off Delay Time	$V_{CC} = 300 \text{ V}, I_{C} = 15\text{A},$		44	65	ns
t _f	Fall Time	$R_G = 13\Omega, V_{GE} = 15V,$		118	200	ns
E _{on}	Turn-On Switching Loss	Inductive Load, T _C = 25°C		320		uJ
E _{off}	Turn-Off Switching Loss			356		uJ
E _{ts}	Total Switching Loss			676	950	uJ
t _{d(on)}	Turn-On Delay Time			20		ns
t _r	Rise Time			34		ns
t _{d(off)}	Turn-Off Delay Time	$V_{CC} = 300 \text{ V}, I_{C} = 15\text{A},$		48	70	ns
t _f	Fall Time	$R_G = 13\Omega, V_{GE} = 15V,$		212	350	ns
E _{on}	Turn-On Switching Loss	Inductive Load, T _C = 125°C		340		uJ
E _{off}	Turn-Off Switching Loss			695		uJ
E _{ts}	Total Switching Loss			1035	1450	uJ
T _{sc}	Short Circuit Withstand Time	V _{CC} = 300 V, V _{GE} = 15V @ T _C = 100°C	10			us
Q _q	Total Gate Charge			42	60	nC
Q _{ge}	Gate-Emitter Charge	$V_{CE} = 300 \text{ V}, I_{C} = 15\text{A},$		7	10	nC
Q _{gc}	Gate-Collector Charge	V _{GE} = 15V		17	24	nC
L _e	Internal Emitter Inductance	Measured 5mm from PKG		7.5		nH

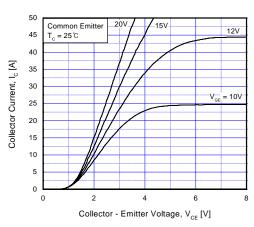


Fig 1. Typical Output Characteristics

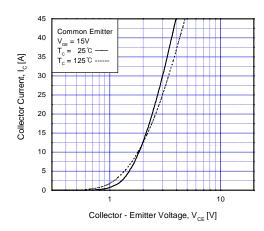


Fig 2. Typical Saturation Voltage Characteristics

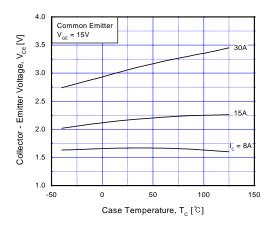


Fig 3. Saturation Voltage vs. Case Temperature at Variant Current Level

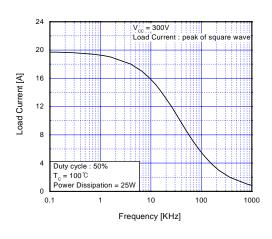


Fig 4. Load Current vs. Frequency

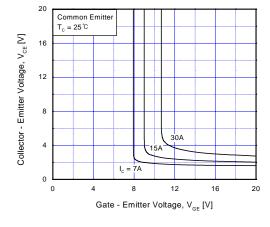


Fig 5. Saturation Voltage vs. V_{GE}

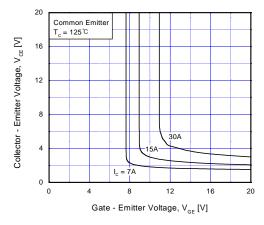


Fig 6. Saturation Voltage vs. $V_{\rm GE}$

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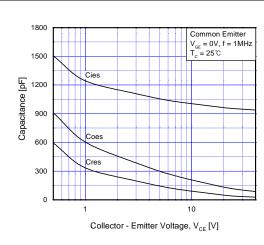


Fig 7. Capacitance Characteristics

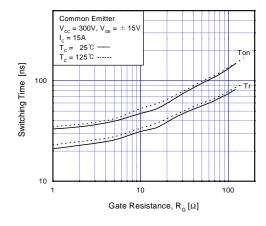


Fig 8. Turn-On Characteristics vs.
Gate Resistance

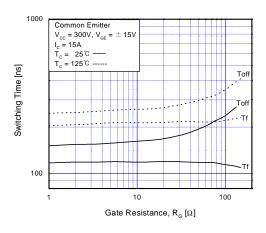


Fig 9. Turn-Off Characteristics vs.
Gate Resistance

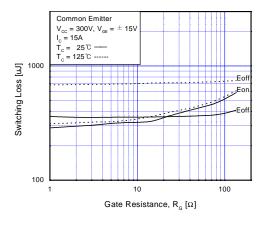


Fig 10. Switching Loss vs. Gate Resistance

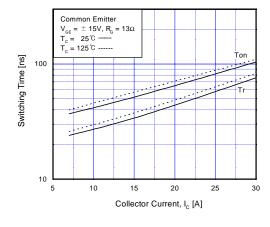


Fig 11. Turn-On Characteristics vs. Collector Current

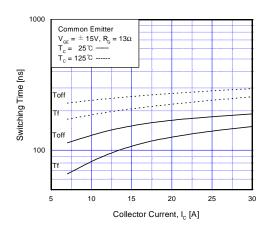
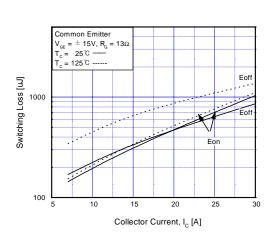


Fig 12. Turn-Off Characteristics vs. Collector Current



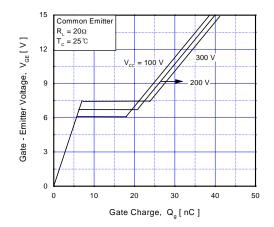
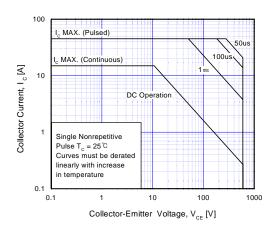


Fig 13. Switching Loss vs. Collector Current

Fig 14. Gate Charge Characteristics



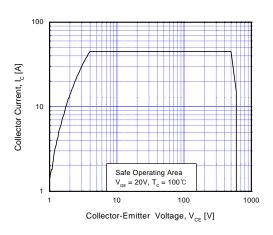


Fig 15. SOA Characteristics

Fig 16. Turn-Off SOA Characteristics

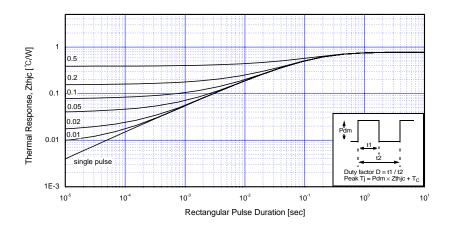


Fig 17. Transient Thermal Impedance of IGBT

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