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FAIRCHILD SEMICONDUCTOR®

August 2001

IGBT

SGR20N40L / SGU20N40L

General Description

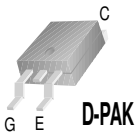
Insulated Gate Bipolar Transistors (IGBTs) with a trench gate structure provide superior conduction and switching performance in comparison with transistors having a planar gate structure. They also have wide noise immunity. These devices are very suitable for strobe applications

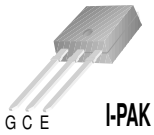
Features

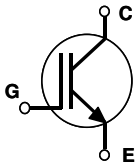
- High input impedance
- High peak current capability (150A)
- Easy gate drive
- Surface Mount : SGR20N40L
- Straight Lead : SGU20N40L

Application

Strobe flash.







Absolute Maximum Ratings

T_C = 25°C unless otherwise noted

Symbol	Description	SGR / SGU20N40L	Units
V_{CES}	Collector - Emitter Voltage	400	V
V_{GES}	Gate - Emitter Voltage	± 6	V
$I_{CM\ (1)}$	Pulsed Collector Current	150	A
P_C	Maximum Power Dissipation @ T_C = 25°C	45	W
T_J	Operating Junction Temperature	-40 to +150	°C
T_{stg}	Storage Temperature Range	-40 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	Typ.	Max.	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	--	3.0	°C/W
$R_{\theta JA}$ (D-PAK)	Thermal Resistance, Junction-to-Ambient (PCB Mount) (2)	--	50	°C/W
$R_{\theta JA}$ (I-PAK)	Thermal Resistance, Junction-to-Ambient	--	110	°C/W

Notes :
(2) Mounted on 1" square PCB (FR4 or G-10 Material)

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 = 1mA	450	--	--	V
I_{CES}	Collector Cut-Off Current	V_{CE} = V_{CES}, V_{GE} = 0V	--	--	10	μA
I_{GES}	G-E Leakage Current	V_{GE} = V_{GES}, V_{CE} = 0V	--	--	±0.1	μA
On Characteristics						
$V_{GE(th)}$	G-E Threshold Voltage	I_C = 1mA, V_{CE} = V_{GE}	0.5	1.0	1.4	V
$V_{CE(sat)}$	C-E Saturation Current	I_C = 150A, V_{GE} = 4.5V	2.0	4.5	8.0	V
Dynamic Characteristics						
C_{ies}	Input Capacitance	V_{GE} = 0V, V_{CE} = 30V, f = 1MHz	--	3800	--	pF
C_{oes}	Output Capacitance		--	50	--	pF
C_{res}	Reverse Transfer Capacitance		--	35	--	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{CC} = 300V, I_C = 150A, V_{GE} = 4.5V, R_G = 15Ω* Resistive Load	--	0.2	--	μs
t_r	Rise Time		--	1.7	--	μs
$t_{d(off)}$	Turn-Off Delay Time		--	0.3	0.5	μs
t_f	Fall Time		--	1.5	2.0	μs

* Notes : Recommendation of R_G Value : R_G≥15Ω

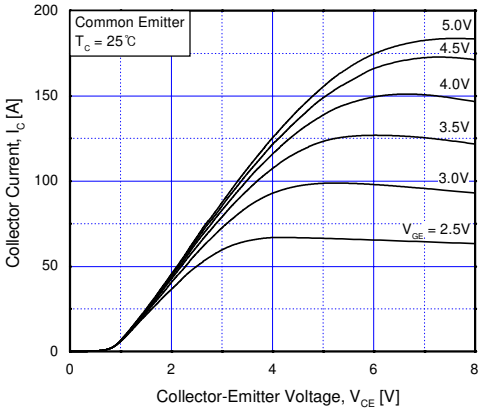


Fig 1. Typical Output Characteristics

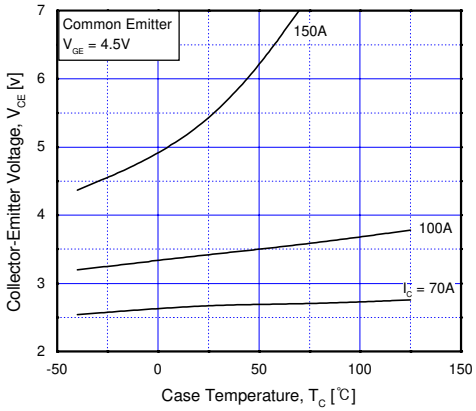


Fig 2. Saturation Voltage vs. Case Temperature at Variant Current Level

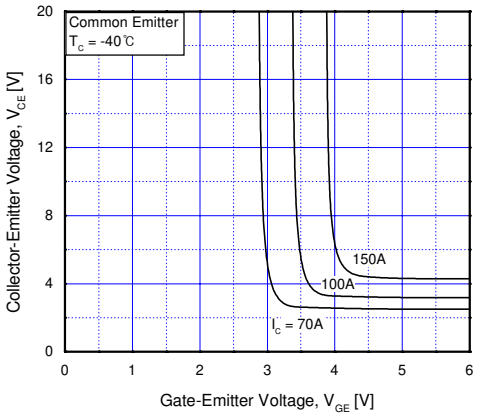


Fig 3. Saturation Voltage vs. V_{GE}

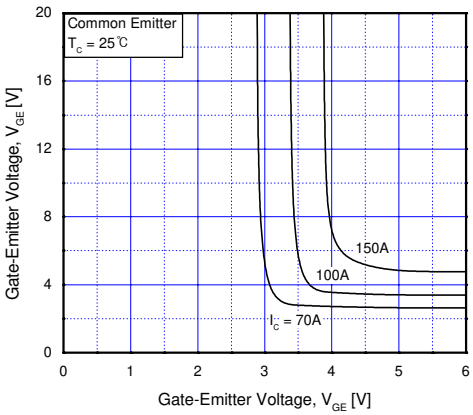


Fig 4. Saturation Voltage vs. V_{GE}

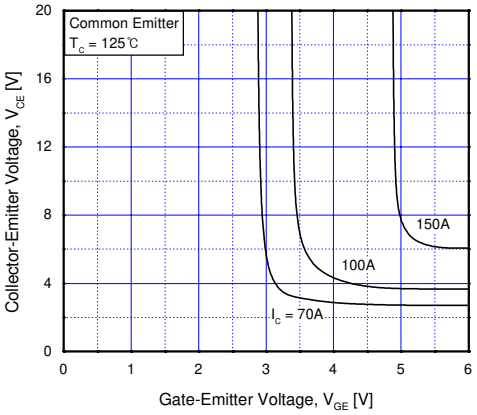


Fig 5. Saturation Voltage vs. V_{GE}

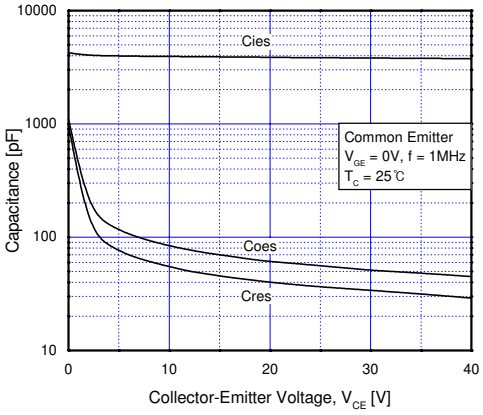


Fig 6. Capacitance Characteristics

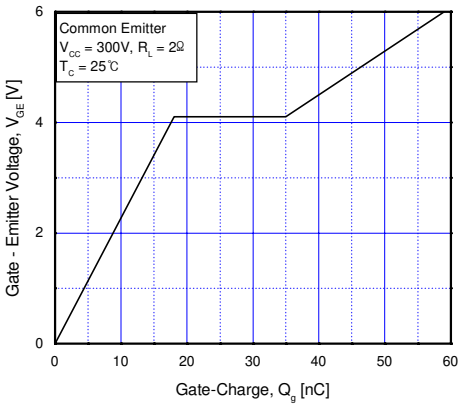


Fig 7. Turn-On Characteristics vs. Gate Resistance

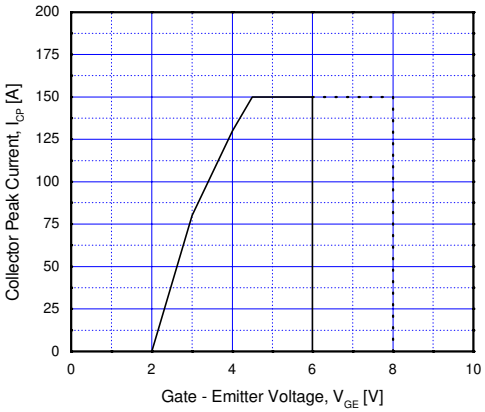


Fig 8. Collector Current Limit vs. Gate - Emitter Voltage Limit

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