FAIRCHILD SEMICONDUCTOR®

August 2001

IGBT

SGR20N40L / SGU20N40L

General Description

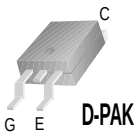
Insulated Gate Bipolar Transistors (IGBTs) with a trench gate structure provide superior conduction and switching performance in comparison with transistors having a planar gate structure. They also have wide noise immunity. These devices are very suitable for strobe applications

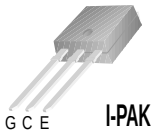
Features

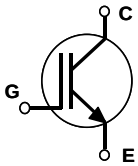
- High input impedance
- High peak current capability (150A)
- Easy gate drive
- Surface Mount : SGR20N40L
- Straight Lead : SGU20N40L

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

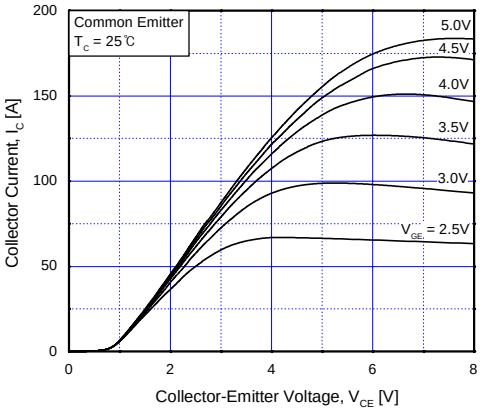


Fig 1. Typical Output Characteristics

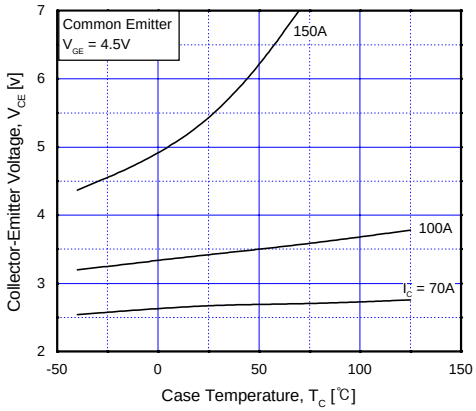


Fig 2. Saturation Voltage vs. Case Temperature at Variant Current Level

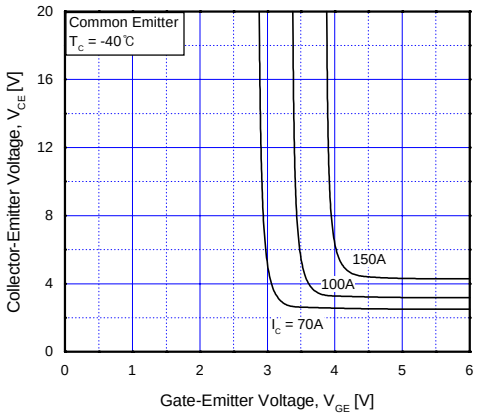


Fig 3. Saturation Voltage vs. V_{GE}

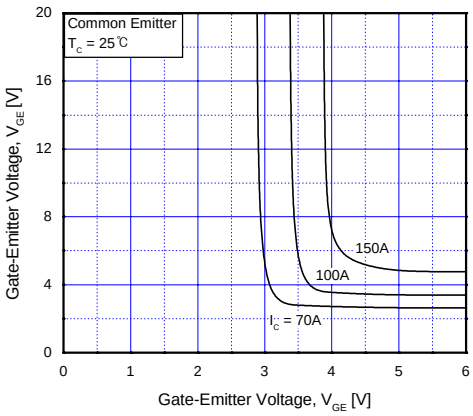


Fig 4. Saturation Voltage vs. V_{GE}

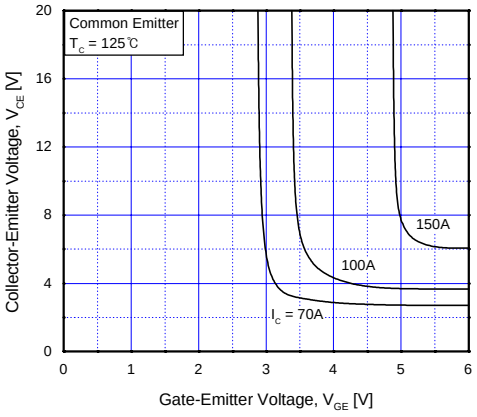


Fig 5. Saturation Voltage vs. V_{GE}

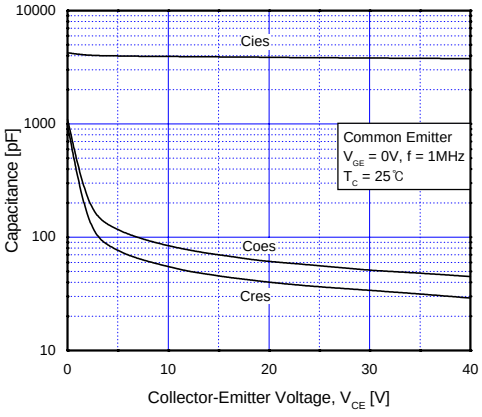


Fig 6. Capacitance Characteristics

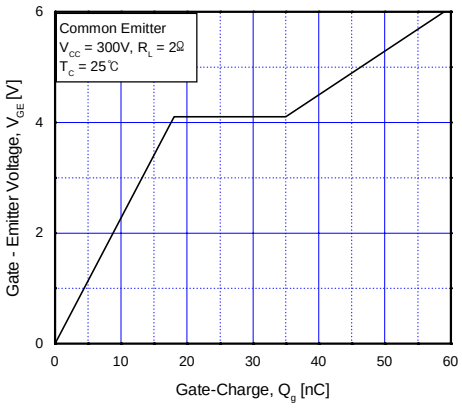


Fig 7. Turn-On Characteristics vs. Gate Resistance

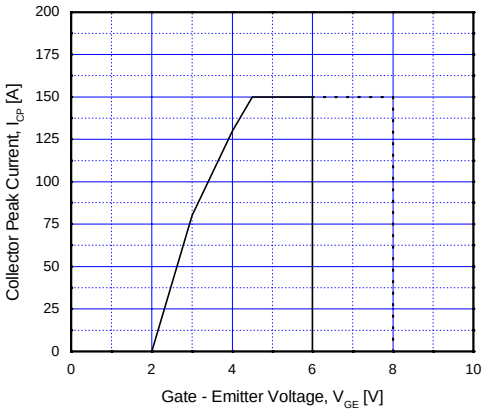


Fig 8. Collector Current Limit vs. Gate - Emitter Voltage Limit

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
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No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.

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Discrete, IGBT

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- High Peak Current Capability (150A)
- Easy Gate Drive
- Surface Mount: SGR20N40L
- Straight Lead: SGU20N40L

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Applications

- Strobe Flash

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Product status/pricing/packaging

Product	Product status	Pricing*	Package type	Leads	Packing method
SGR20N40LTF	Full Production	$1.53	TO-252(DPAK)	2	TAPE REEL
SGR20N40LTM	Full Production	$1.53	TO-252(DPAK)	2	TAPE REEL

* 1,000 piece Budgetary Pricing

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Models

Package & leads	Condition	Software version	Revision date
PSPICE			
TO-252(DPAK)-2	Electrical	9.2	May 23, 2001

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Product status/pricing/packaging

Product	Product status	Pricing*	Package type	Leads	Packing method
SGU20N40LTU	Full Production	$1.53	TO-251(IPAK)	3	RAIL

* 1,000 piece Budgetary Pricing

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Package & leads	Condition	Software version	Revision date
PSPICE			
TO-251(IPAK)-3	Electrical	9.2	May 23, 2001

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