SGS-THOMSON MICROELECTRONICS

STGP10N50A

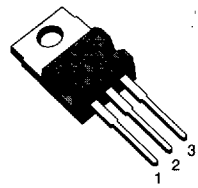
ISOLATED GATE BIPOLAR TRANSISTOR (IGBT)

PRELIMINARY DATA

- HIGH INPUT IMPEDANCE (VOLTAGE DRIVEN)
- VERY LOW ON-VOLTAGE DROP $V_{CE(SAT)}$
- HIGH RELIABILITY LEVEL
- HIGH CURRENT CAPABILITY
- OFF LOSSES INCLUDE TAIL CURRENT

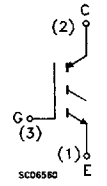
APPLICATIONS:

- AUTOMOTIVE IGNITION
- LIGHT DIMMER
- S.M.P.S. SOFT START



TO-220

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CES}	Collector-Emitter Voltage (V_{GE} = 0)	500	V
V_{CER}	Collector-Emitter Voltage (R_{GE}= 20 kΩ)	500	V
V_{GE}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current (continuous) at T_c = 25 °C	20	A
I_C	Collector Current (continuous) at T_c = 100 °C	10	A
I_{CM}(•)	Collector Current (pulsed)	100	A
P_{tot}	Total Dissipation at T_c = 25 °C	100	W
	Derating Factor	0.8	W/°C
T_{stg}	Storage Temperature	-65 to 150	°C
T_j	Max. Operating Junction Temperature	150	°C

(•) Pulse width limited by safe operating area

THERMAL DATA

$R_{thj\text{-}case}$	Thermal Resistance Junction-Case	Max	1.25	°C/W
$R_{thj\text{-}amb}$	Thermal Resistance Junction-Ambient	Max	62.5	°C/W
$R_{thc\text{-}h}$	Thermal Resistance Case-Heartsink	Max	0.1	°C/W

ELECTRICAL CHARACTERISTICS (T_j = 25 °C unless otherwise specified)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	I_C = 250 µA V_{GE} = 0	500			V
I_{CES}	Collector Cut-off Current (V_{GE} = 0)	V_{CE} = Max Rating V_{CE} = Max Rating x 0.8 T_j = 125 °C			250 1	µA mA
I_{GES}	Gate-Emitter Leakage Current (V_{CE} = 0)	V_{GE} = ± 20 V V_{CE} = 0			100	nA

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GE(th)}$	Gate Threshold Voltage	V_{CE} = V_{GE} I_C = 250 µA	2		4	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE} = 15 V I_C = 10 A V_{GE} = 15 V I_C = 10 A T_j = 100 °C		1.85 1.75	 2.2	V V

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs}	Forward Transconductance	V_{CE} = 20 V I_C = 10 A	2.5	6		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{CE} = 25 V f = 1 MHz V_{GE} = 0		900 90 30	1250 140 42	pF pF pF
Q_g	Gate Charge	V_{CE} = 400 V V_{GE} = 15 V I_C = 10 A		55		nC

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Time Rise Time	I_C = 10 A V_{CC} = 400 V V_{GE} = 15 V R_{GE} = 100 Ω		35 100	50 150	ns ns
di_C/dt	Turn-on Current Slope	I_C = 10 A V_{CC} = 400 V V_{GE} = 15 V R_{GE} = 100 Ω T_j = 100 °C		220		A/ms
E_{on}	Turn-on Switching Losses	I_C = 10 A V_{CC} = 400 V V_{GE} = 15 V R_{GE} = 100 Ω T_j = 100 °C		185	220	µJ
$V_{CE(350ms)}$	Collector-Emitter Dynamic Voltage	I_C = 10 A V_{CC} = 400 V V_{GE} = 15 V R_{GE} = 100 Ω T_j = 100 °C			7	V
$V_{CE(610ms)}$	Collector-Emitter Dynamic Voltage	I_C = 10 A V_{CC} = 400 V V_{GE} = 15 V R_{GE} = 100 Ω T_j = 100 °C			4	V

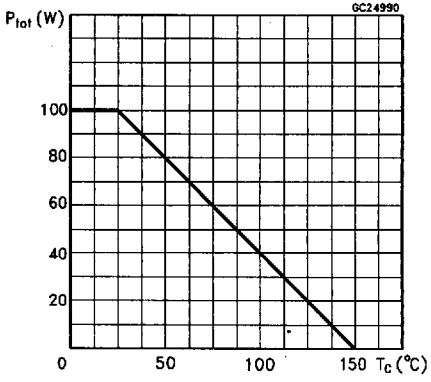
ELECTRICAL CHARACTERISTICS (continued)

SWITCHING OFF

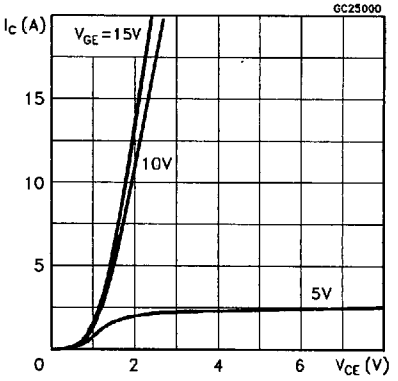
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_c	Cross-Over Time	V_{CC} = 400 V I_C = 10 A		1500		ns
$t_{r(Voff)}$	Off Voltage Rise Time	R_{GE} = 100 Ω V_{GE} = 15 V		170		ns
t_f	Fall Time			1000		ns
E_{off} (**)	Turn-off Switching Loss			2.2	3.25	mJ
t_c	Cross-Over Time	V_{CC} = 400 V I_C = 10 A		2600		ns
$t_{r(Voff)}$	Off Voltage Rise Time	R_{GE} = 100 Ω V_{GE} = 15 V		190		ns
t_f	Fall Time	T_j = 100 °C		2000		ns
E_{off} (**)	Turn-off Switching Loss			3.8	4.8	mJ

(*) Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %
(**) Losses include olso the tail (Jedec Standardization)

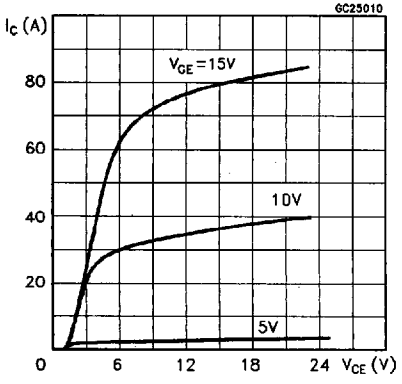
Derating Curves



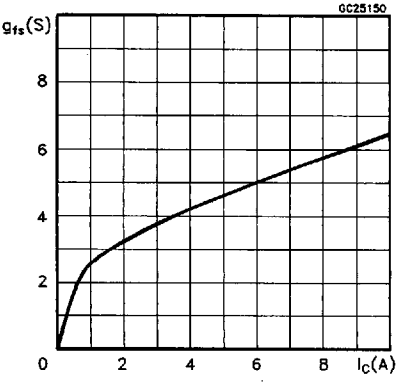
Output Characteristics



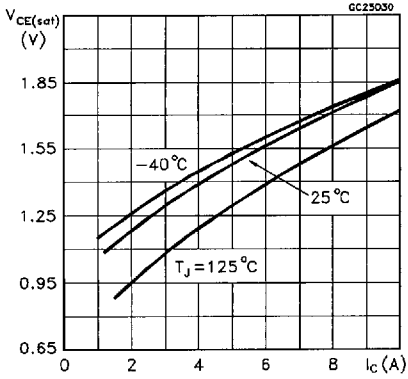
Output Characteristics



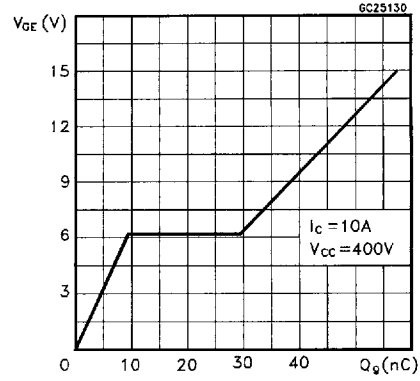
Transconductance



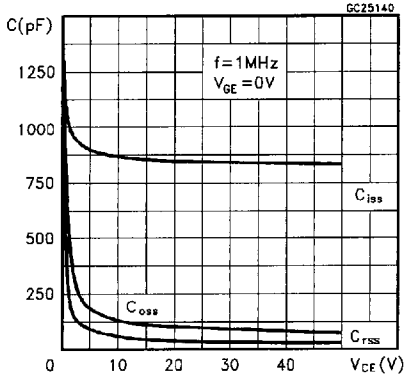
Static Collector-Emitter On Voltage



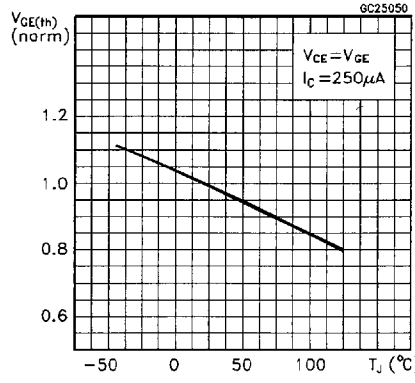
Gate Charge vs Gate-Emitter Voltage



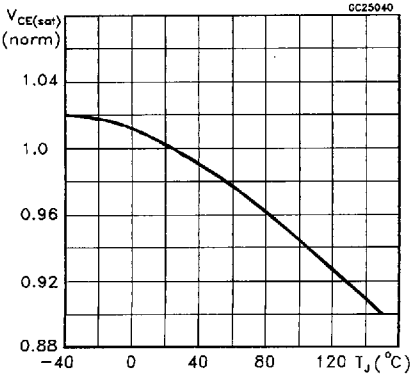
Capacitance Variation



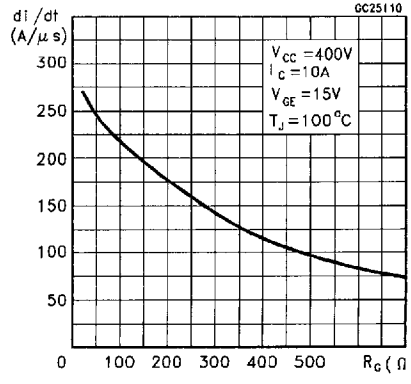
Normalized Gate Threshold Voltage vs Temperature



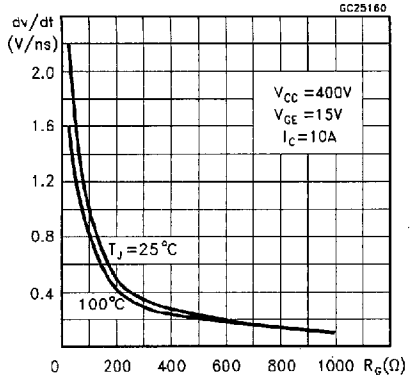
Normalized On Voltage vs Temperature



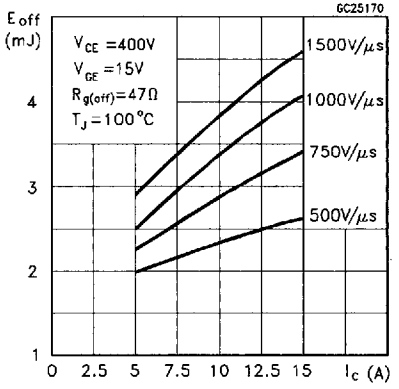
Turn On Current Slope vs Gate-Emitter Resistance



Turn Off Voltage Slope vs Gate-Emitter Resistance



Off Loses vs dv/dt



Off Loses vs Junction Temperature and Supply Voltage