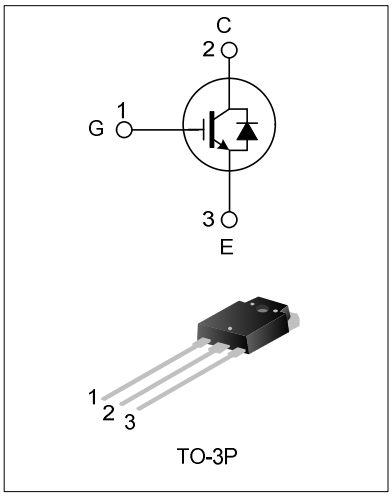
40A, 600V FIELD STOP IGBT

DESCRIPTION

SGT40N60NPFDPN using Field Stop IGBT technology, offer the optimum performance for induction Heating, UPS, SMPS and PFC application.



FEATURES

- 40A, 600V, $V_{CE(sat)(typ.)}$=1.8V@I_C=40A
- Low conduction loss
- Fast switching
- High input impedance

NOMENCLATURE

SGT 40 N E 60 □□□□ PN

- IGBT series
- Current: 20 denotes 20A
- N Channel
- E: ESD
  Blank: no ESD
- Voltage: 120 denotes 1200V
- Package: e.g. PN denotes TO-3P package
- D: internal FRD
  Blank: no internal FRD
- F: Field stop technology
  Blank: not Field stop technology
- T: Trench technology
  Blank: not Trench technology
- NP: NPT technology
  P: PT technology

ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing
SGT40N60NPFDPN	TO-3P	40N60NPFD	Pb free	Tube

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

Parameter		Symbol	Ratings	Units
Collector to Emitter Voltage		V_{CE}	600	V
Gate to Emitter Voltage		V_{GE}	±20	V
Collector Current	T_C=25°C	I_C	80	A
	T_C=100°C		40	
Pulsed Collector Current		I_{CM}	120	A
Maximum Power Dissipation (T_C=25°C)		P_D	290	W
			2.32	W/°C
Operating Junction Temperature		T_J	-55～+175	°C
Storage Temperature Range		T_{stg}	-55～+175	°C

THERMAL CHARACTERISTICS

Parameter	Symbol	Ratings	Units
Thermal Resistance, Junction to Case (IGBT)	$R_{\theta JC}$	0.24	°C/W
Thermal Resistance, Junction to Case (FRD)	$R_{\theta JC}$	1.4	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	35.5	°C/W

ELECTRICAL CHARACTERISTICS OF IGBT (T_C = 25°C unless otherwise noted)

Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Units
Collector to Emitter Breakdown Voltage	BV_{CE}	V_{GE}=0V,I_C=250uA	600	--	--	V
C-E Leakage Current	I_{CES}	V_{CE}=600V,V_{GE}=0V	--	--	200	uA
G-E Leakage Current	I_{GES}	V_{GE}=20V,V_{CE}=0V	--	--	±500	nA
G-E Threshold Voltage	$V_{GE(th)}$	I_C=250uA,V_{CE}=V_{GE}	4.0	5.0	6.5	V
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=40A,V_{GE}=15V	--	1.8	2.7	V
		I_C=40A,V_{GE}=15V,T_C=125°C	--	2.1	--	V
Input Capacitance	C_{ies}	V_{CE}=30V V_{GE}=0V f=1MHz	--	1850	--	pF
Output Capacitance	C_{oes}		--	180	--	
Reverse Transfer Capacitance	C_{res}		--	50	--	
Turn-On Delay Time	$T_{d(on)}$	V_{CE}=400V I_C=40A R_g=10Ω V_{GE}=15V Inductive Load,	--	18	--	ns
Rise Time	T_r		--	80	--	
Turn-Off Delay Time	$T_{d(off)}$		--	110	--	
Fall Time	T_f		--	105	--	
Turn-On Switching Loss	E_{on}		--	1.87	--	mJ
Turn-Off Switching Loss	E_{off}		--	0.68	--	
Total Switching Loss	E_{st}		--	2.55	--	
Total Gate Charge	Q_g	V_{CE} = 300V, I_C=20A, V_{GE} = 15V	--	100	--	nC
Gate to Emitter Charge	Q_{ge}		--	11	--	
Gate to Collector Charge	Q_{gc}		--	52	--	

ELECTRICAL CHARACTERISTICS OF FRD (T_C = 25°C unless otherwise noted)

Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Units
Diode Forward Voltage	V_{fm}	I_F = 20A T_C=25°C	--	1.9	2.6	V
		I_F = 20A T_C=125°C	--	1.5	--	
Diode Reverse Recovery Time	T_{rr}	I_{ES} =20A, dI_{ES}/dt=200A/μs	--	32	--	ns
Diode Reverse Recovery Charge	Q_{rr}	I_{ES} =20A, dI_{ES}/dt=200A/μs	--	74	--	nC

TYPICAL CHARACTERISTICS CURVE

Figure 1. Typical output characteristics

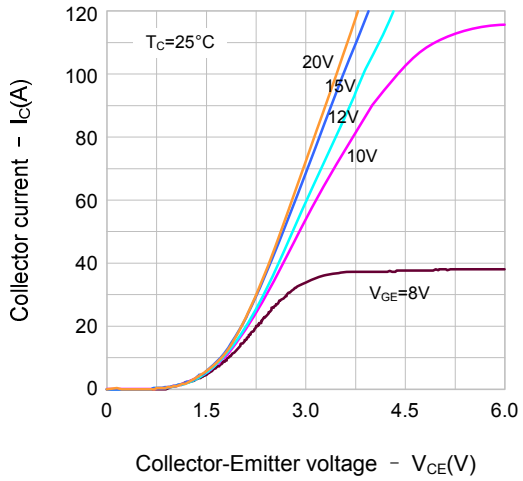


Figure 2. Typical output characteristics

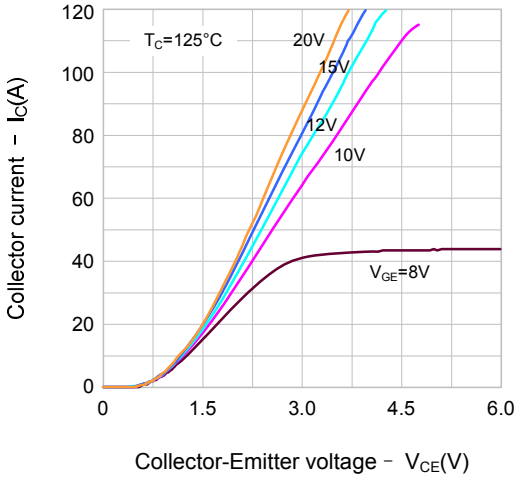


Figure 3. Typical saturation voltage characteristic

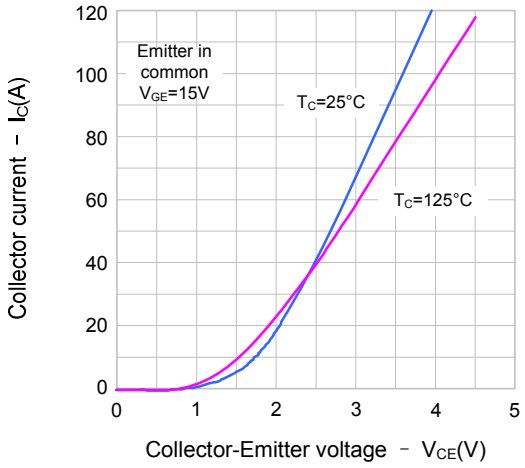


Figure 4. Transmission characteristic

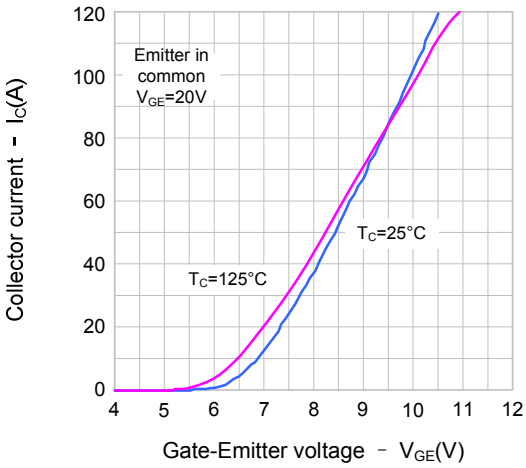


Figure 5. Saturation voltage vs. V_{GE}

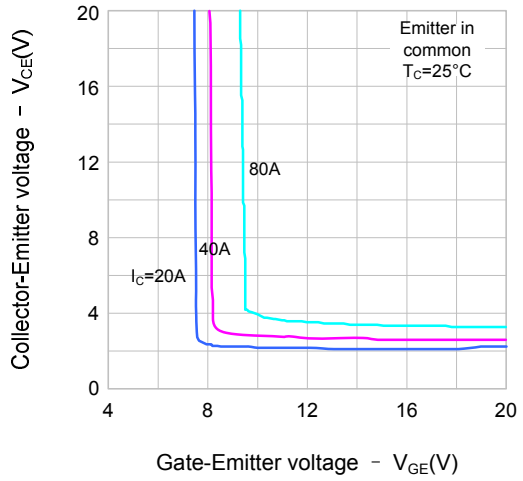
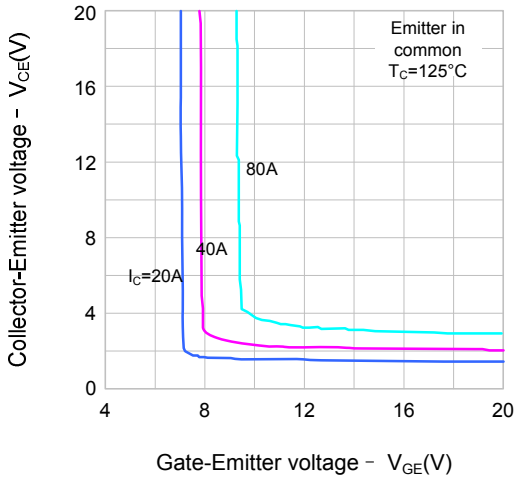


Figure 6. Saturation voltage vs. V_{GE}



TYPICAL CHARACTERISTICS CURVE (CONTINUED)

Figure 7. Capacitance characteristic

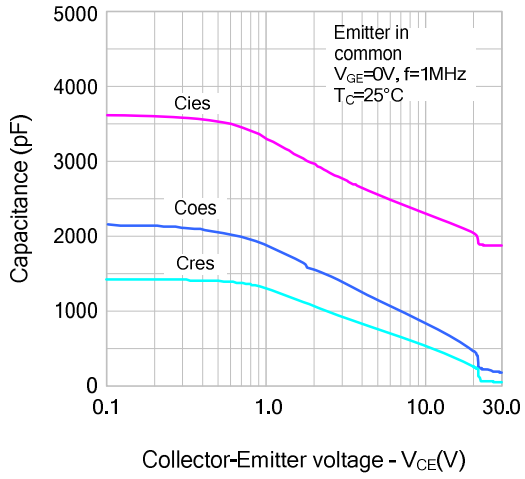


Figure 8. Gate charge characteristic

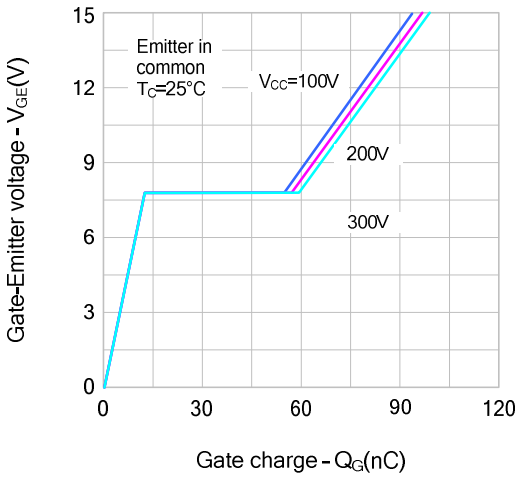


Figure 9. Turn-on characteristic vs. Gate resistance

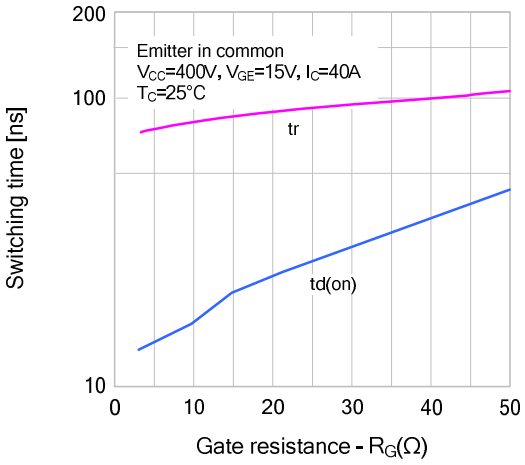


Figure 10. Turn-off characteristic vs. Gate resistance

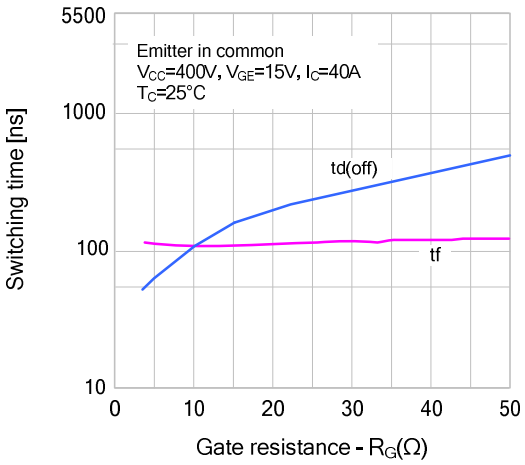


Figure 11. Switching loss vs. Gate resistance

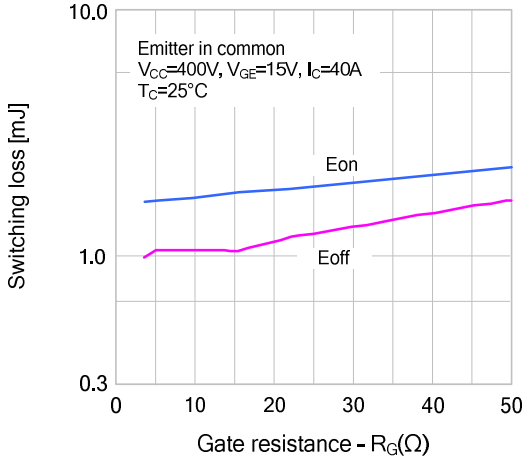
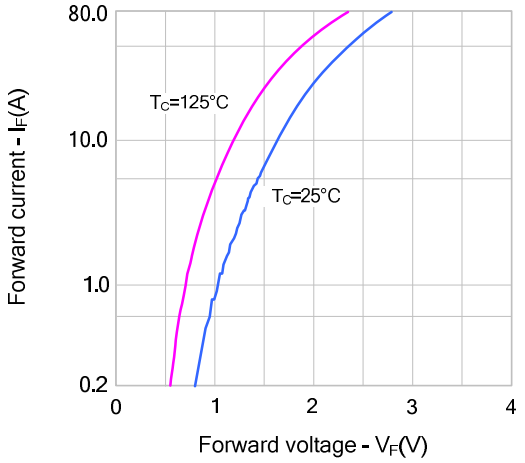


Figure 12. Forward characteristic



TYPICAL CHARACTERISTICS CURVE (CONTINUED)

Figure 13. SOA Characteristics

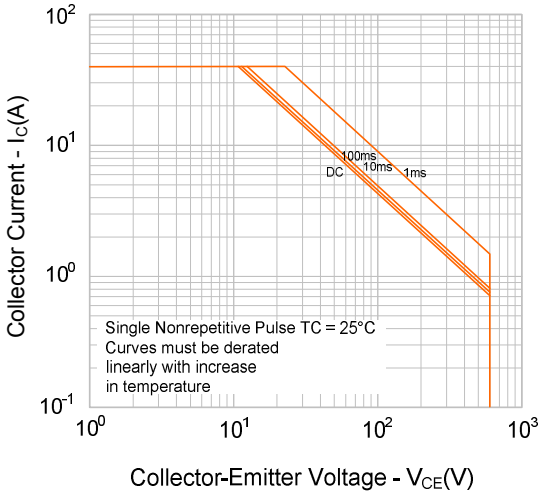
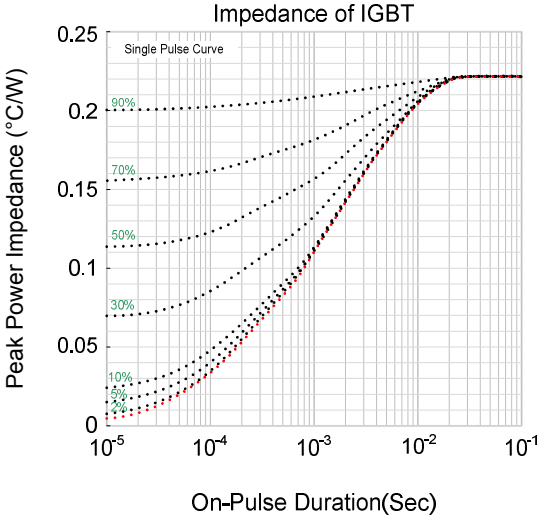
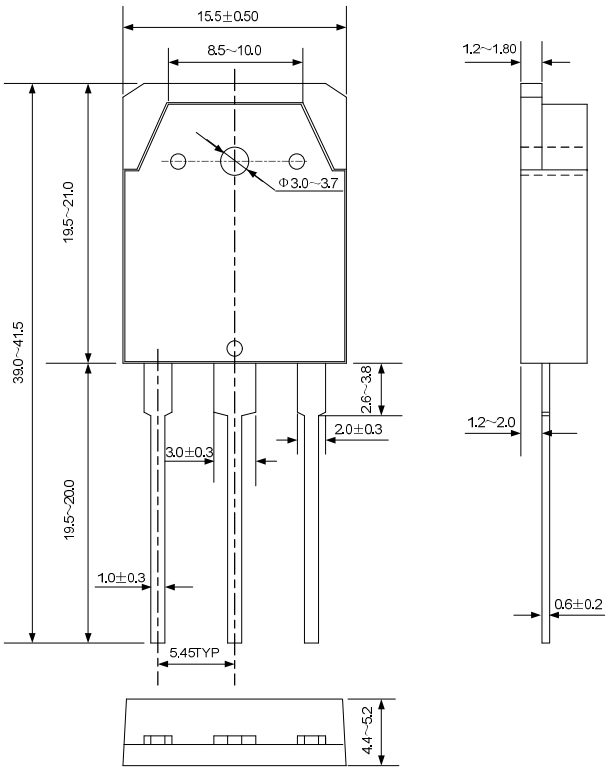


Figure 14. Transient Thermal Impedance of IGBT



PACKAGE OUTLINE

TO-3P **Unit:mm**



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Rev.: 1.3

Revision History:

1. Modify the Max Value of Junction Temperature

Rev.: 1.2

Revision History:

1. Modify the electrical characteristic of IGBT

Rev.: 1.1

Revision History:

1. Add pin No.
2. Modify the package outline of TO-3P

Rev.: 1.0

Revision History:

1. First release