

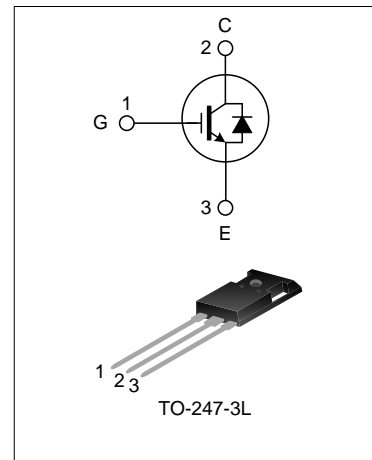
## 40A, 600V IGBT

### DESCRIPTION

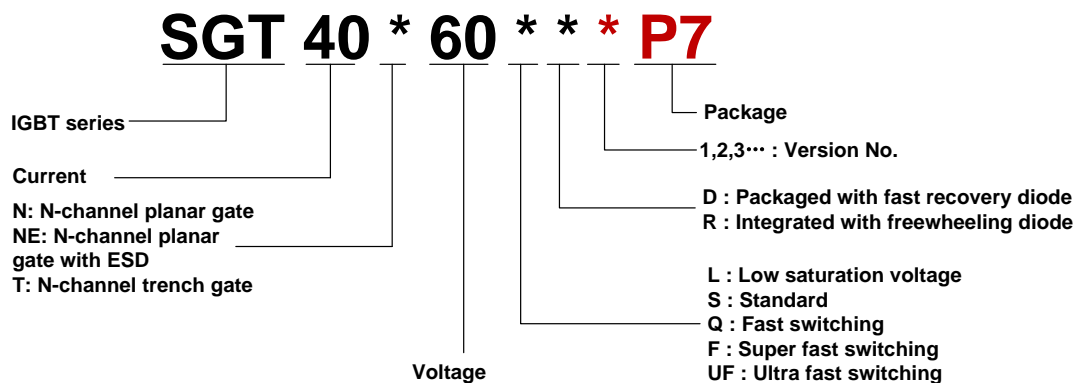
SGT40N60FD1P7 using Punch Through IGBT technology, offer the optimum performance for induction Heating, UPS, SMPS and PFC application.

### FEATURES

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



### NOMENCLATURE



### ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SGT40N60FD1P7	TO-247-3L	40N60FD1	Halogen free	Tube

### ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ$ , unless otherwise noted)

Characteristics	Symbol	Ratings	Units
Collector to Emitter Voltage	$V_{CE}$	600	V
Gate to Emitter Voltage	$V_{GE}$	$\pm 20$	V
Collector Current	$I_C$	$T_C = 25^\circ C$	80
		$T_C = 100^\circ C$	40
Pulsed Collector Current	$I_{CM}$	120	A
Maximum Power Dissipation ( $T_C = 25^\circ C$ ) -Reduction per degree Celsius above $25^\circ C$	$P_D$	290	W
		2.32	$W/^\circ C$
Operating Junction Temperature	$T_J$	$-55 \sim +150$	$^\circ C$
Storage Temperature Range	$T_{stg}$	$-55 \sim +150$	$^\circ C$

## THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings	Units
Thermal Resistance, Junction to Case (IGBT)	$R_{\theta JC}$	0.52	$^{\circ}\text{C/W}$
Thermal Resistance, Junction to Case (FRD)	$R_{\theta JC}$	1.9	$^{\circ}\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	40	$^{\circ}\text{C/W}$

## ELECTRICAL CHARACTERISTICS OF IGBT ( $T_C = 25^{\circ}\text{C}$ unless otherwise noted)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Units
Collector to Emitter Breakdown Voltage	$BV_{CE}$	$V_{GE}=0V, I_C=100\mu A$	600	--	--	V
C-E Leakage Current	$I_{CES}$	$V_{CE}=600V, V_{GE}=0V$	--	--	200	$\mu A$
G-E Leakage Current	$I_{GES}$	$V_{GE}=20V, V_{CE}=0V$	--	--	$\pm 500$	nA
Gate Threshold Voltage	$V_{GE(th)}$	$I_C=250\mu A, V_{CE}=V_{GE}$	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
		$I_C=40A, V_{GE}=15V$ $T_C=125^{\circ}\text{C}$	--	2.5	--	V
Input Capacitance	$C_{ies}$	$V_{CE}=30V$	--	1850	--	pF
Output Capacitance	$C_{oes}$	$V_{GE}=0V$	--	190	--	
Reverse Transfer Capacitance	$C_{res}$	$f=1\text{MHz}$	--	50	--	
Turn-On Delay Time	$T_{d(on)}$	$V_{CE}=400V$ $I_C=40A$ $R_g=10\Omega$	--	16	--	ns
Rise Time	$T_r$		--	88	--	
Turn-Off Delay Time	$T_{d(off)}$		--	110	--	
Fall Time	$T_f$		--	96	--	
Turn-On Switching Loss	$E_{on}$	Inductive Load, $V_{GE}=15V$	--	1.8	--	mJ
Turn-Off Switching Loss	$E_{off}$		--	0.8	--	
Total Switching Loss	$E_{st}$		--	2.6	--	
Total Gate Charge	$Q_g$	$V_{CE} = 300V, I_C=40A,$ $V_{GE} = 15V$	--	100	--	nC
Gate to Emitter Charge	$Q_{ge}$		--	11	--	
Gate to Collector Charge	$Q_{gc}$		--	52	--	

## ELECTRICAL CHARACTERISTICS OF FRD ( $T_C = 25^{\circ}\text{C}$ unless otherwise noted)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Units
Diode Forward Voltage	$V_{FM}$	$I_F = 20A, T_C=25^{\circ}\text{C}$	--	1.9	2.6	V
		$I_F = 20A, T_C=125^{\circ}\text{C}$	--	1.5	--	
Diode Reverse Recovery Time	$T_{rr}$	$I_{ES}=20A, dI_{ES}/dt=200A/\mu s$	--	32	--	ns
Diode Reverse Recovery Charge	$Q_{rr}$	$I_{ES}=20A, dI_{ES}/dt=200A/\mu s$	--	74	--	nC

**TYPICAL CHARACTERISTIC CURVE**

Figure 1. Typical output characteristics

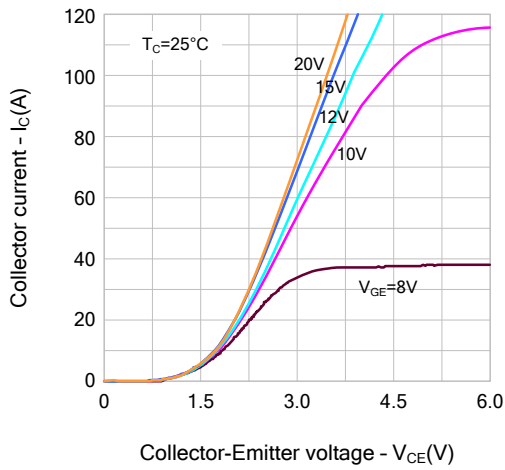


Figure 2. Typical output characteristics

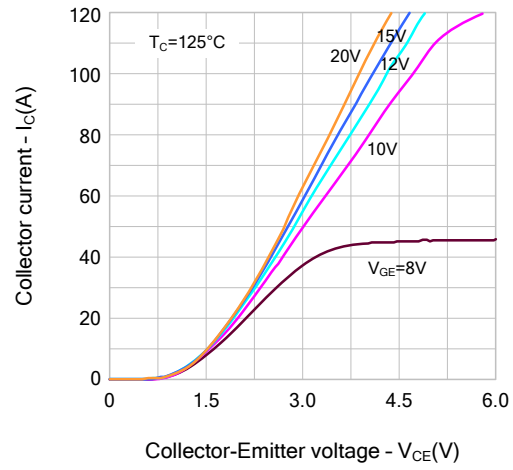


Figure 3. Typical saturation voltage characteristics

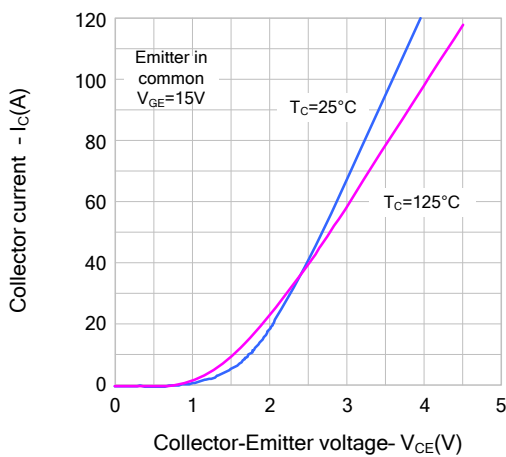


Figure 4. Transmission characteristic

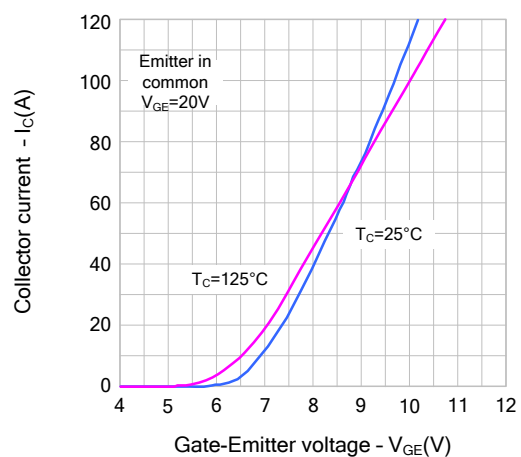


Figure 5. Saturation voltage vs. Vge

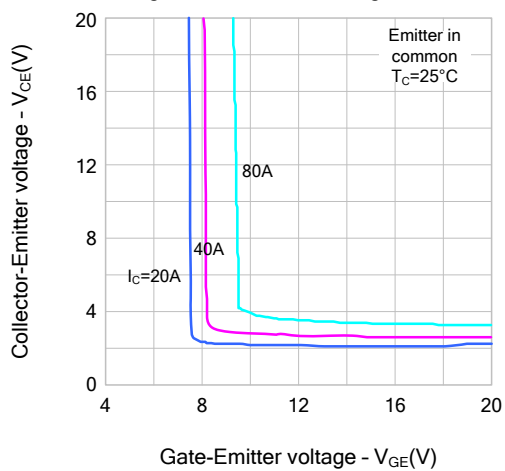
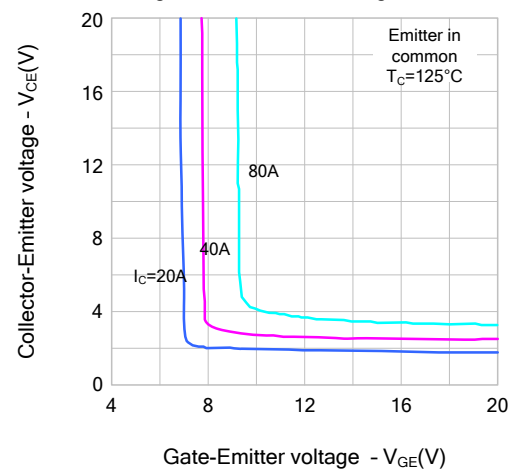


Figure 6. Saturation voltage vs. Vge



**TYPICAL CHARACTERISTIC CURVE (continued)**

Figure 7. Capacitance characteristic

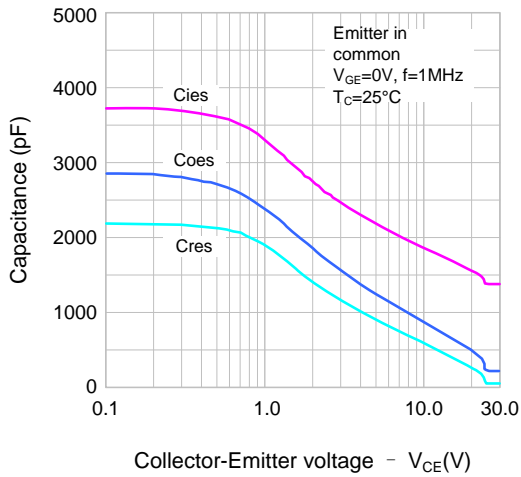


Figure 8. Gate charge characteristic

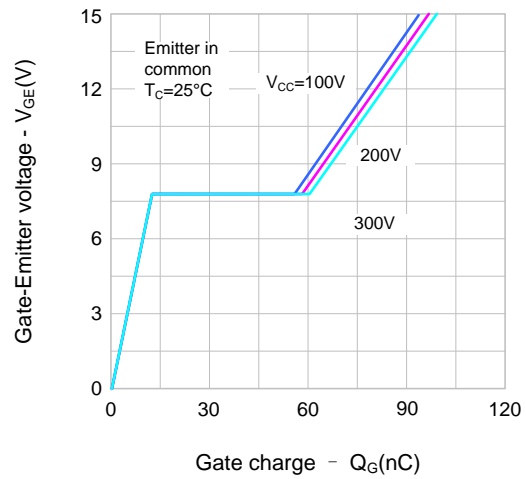


Figure 9. Turn-on characteristic vs. Gate resistance

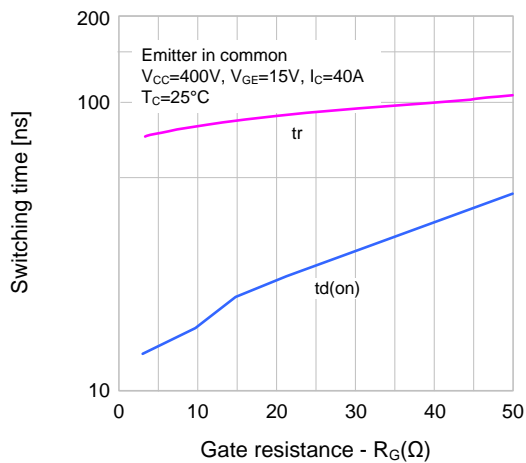


Figure 10. Turn-off characteristic vs. Gate resistance

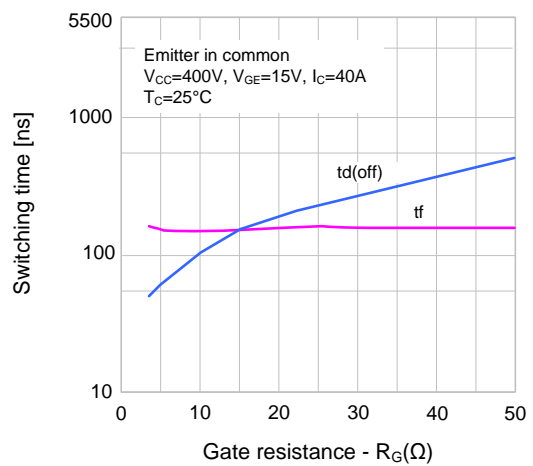


Figure 11. Switching loss vs. Gate resistance

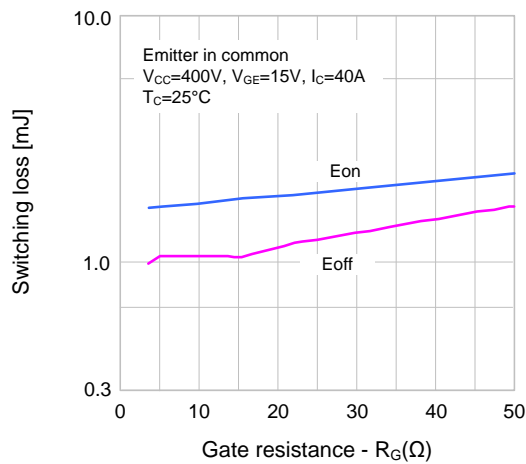
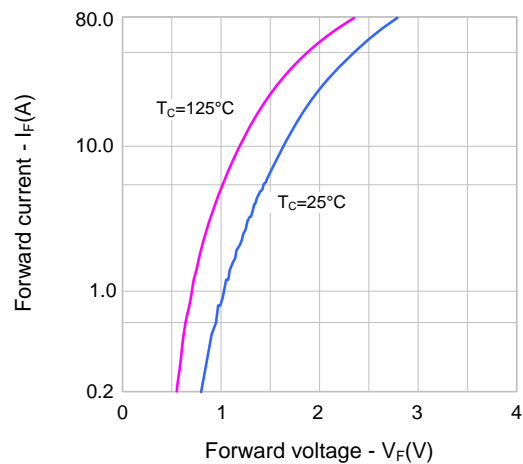


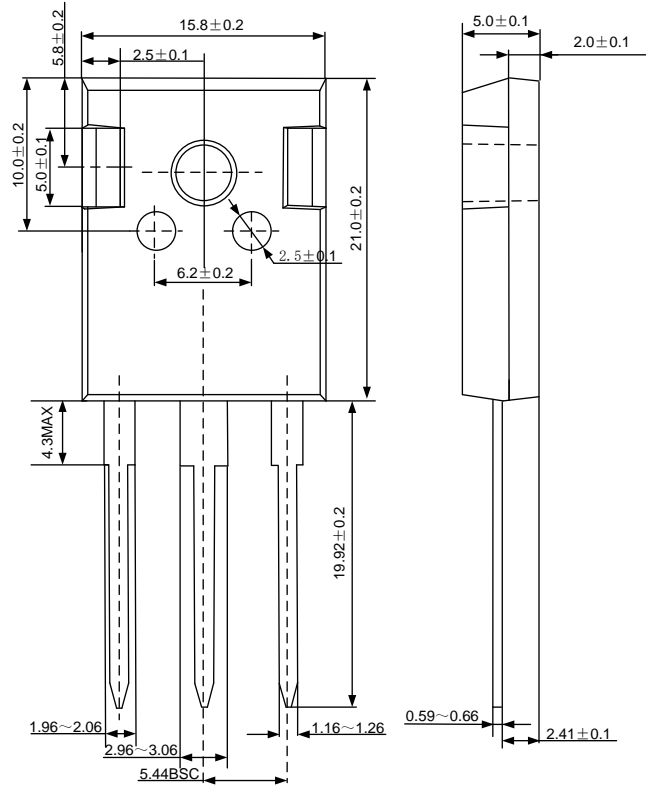
Figure 12. Forward characteristic



**PACKAGE OUTLINE**

TO-247-3L

Unit: mm



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Rev.: 1.0

Revision History:

1. First release

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