

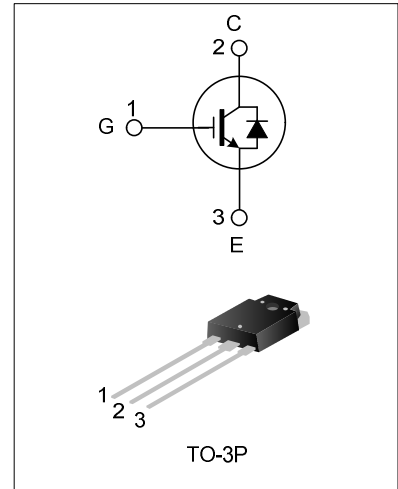
## 40A, 600V FIELD STOP IGBT

### DESCRIPTION

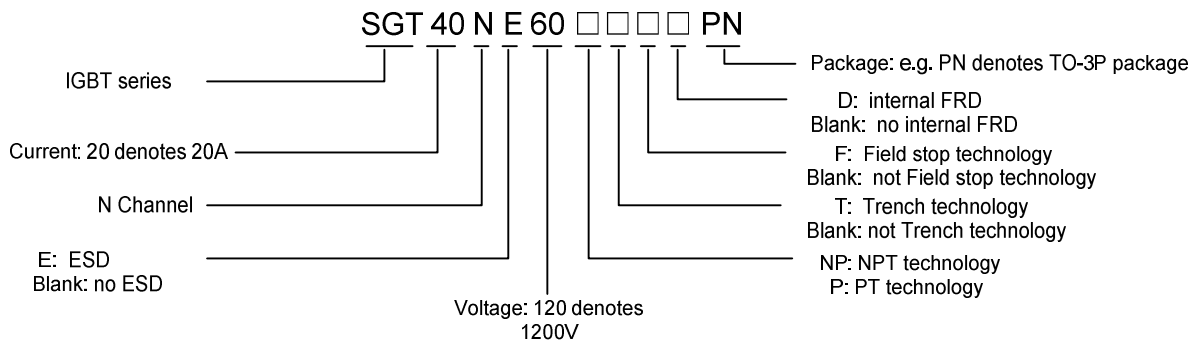
SGT40N60NPFDPN using Field Stop IGBT technology, offer the optimum performance for induction Heating, UPS, SMPS and PFC application.

### FEATURES

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



### NOMENCLATURE



### ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing
SGT40N60NPFDPN	TO-3P	40N60NPFDP	Pb free	Tube

### ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub> = 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	$I_C$	T <sub>C</sub> =25°C	80
		T <sub>C</sub> =100°C	40
Pulsed Collector Current	$I_{CM}$	120	A
Maximum Power Dissipation (T <sub>C</sub> =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	$^{\circ}C/W$
Thermal Resistance, Junction to Case (FRD)	$R_{\theta JC}$	1.4	$^{\circ}C/W$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	35.5	$^{\circ}C/W$

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

Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Units
Collector to Emitter Breakdown Voltage	$BV_{CE}$	$V_{GE}=0V, I_C=250\mu A$	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
G-E 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
		$I_C=40A, V_{GE}=15V, T_C=125^{\circ}C$	--	2.1	--	V
Input Capacitance	$C_{ies}$	$V_{CE}=30V$	--	1850	--	pF
Output Capacitance	$C_{oes}$	$V_{GE}=0V$	--	180	--	
Reverse Transfer Capacitance	$C_{res}$	$f=1MHz$	--	50	--	
Turn-On Delay Time	$T_{d(on)}$	$V_{CE}=400V$ $I_C=40A$ $R_g=10\Omega$	--	18	--	ns
Rise Time	$T_r$		--	80	--	
Turn-Off Delay Time	$T_{d(off)}$		--	110	--	
Fall Time	$T_f$		--	105	--	
Turn-On Switching Loss	$E_{on}$	$V_{GE}=15V$	--	1.87	--	mJ
Turn-Off Switching Loss	$E_{off}$	Inductive Load,	--	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 ( $T_C = 25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Units
Diode Forward Voltage	$V_{fm}$	$I_F = 20A, T_C=25^{\circ}C$	--	1.9	2.6	V
		$I_F = 20A, T_C=125^{\circ}C$	--	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 CHARACTERISTICS CURVE**

Figure 1. Typical output characteristics

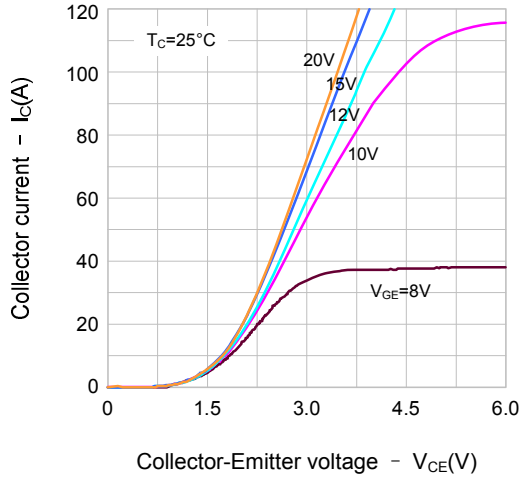


Figure 2. Typical output characteristics

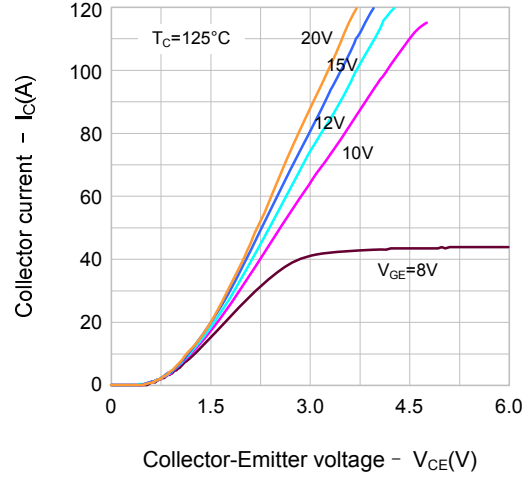


Figure 3. Typical saturation voltage characteristic

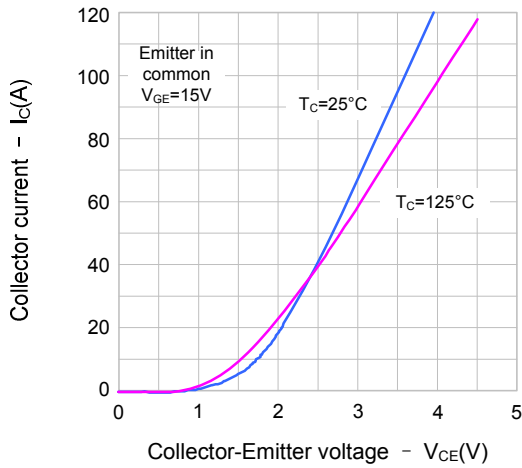


Figure 4. Transmission characteristic

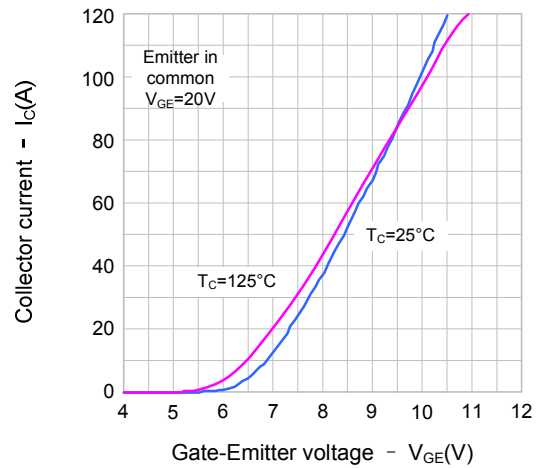


Figure 5. Saturation voltage vs. Vge

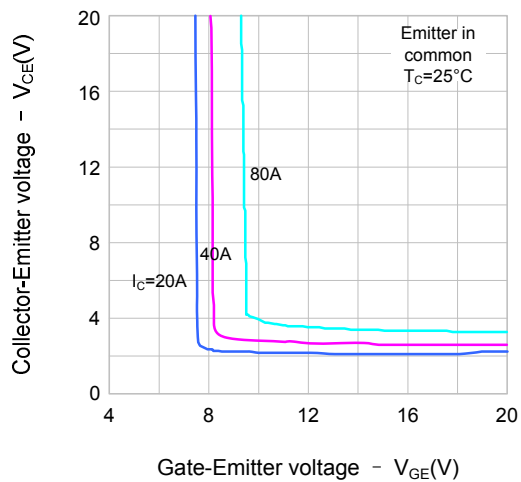
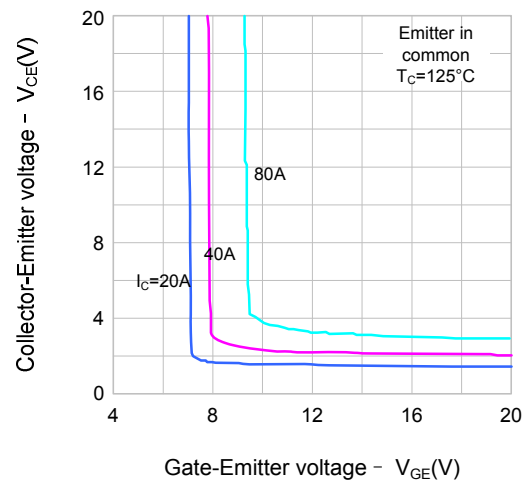


Figure 6. Saturation voltage vs. Vge



**TYPICAL CHARACTERISTICS CURVE (CONTINUED)**

Figure 7. Capacitance characteristic

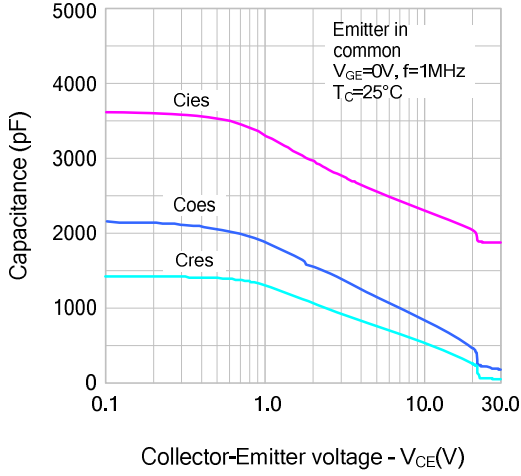


Figure 8. Gate charge characteristic

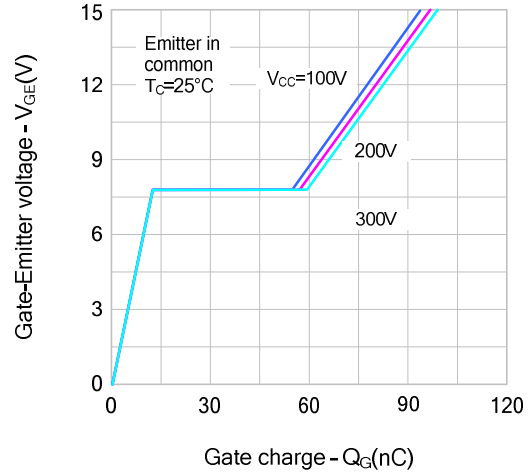


Figure 9. Turn-on characteristic vs. Gate resistance

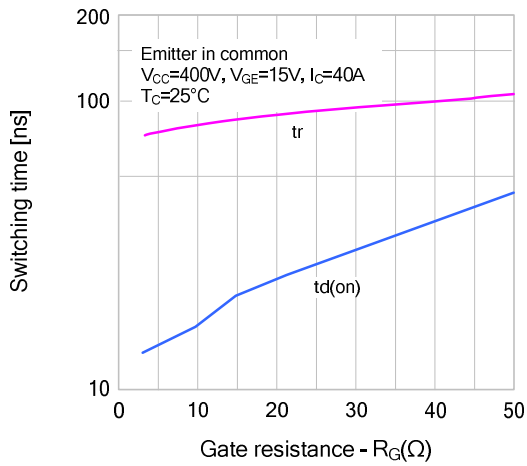


Figure 10. Turn-off characteristic vs. Gate resistance

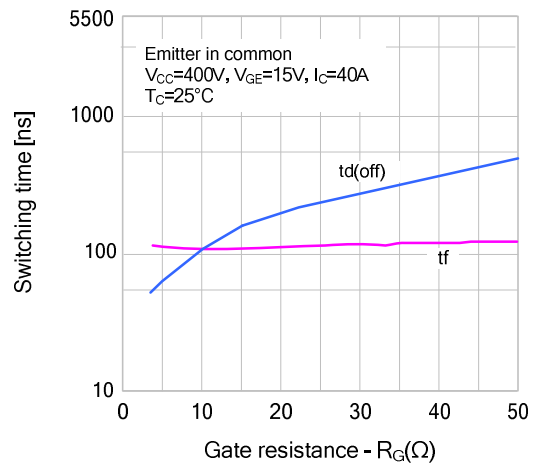


Figure 11. Switching loss vs. Gate resistance

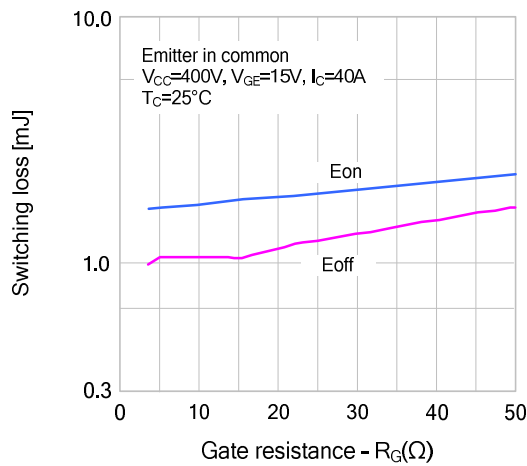
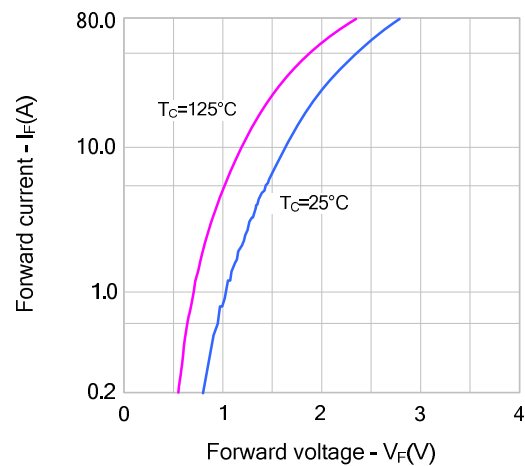


Figure 12. Forward characteristic



**TYPICAL CHARACTERISTICS CURVE (CONTINUED)**

Figure 13. SOA Characteristics

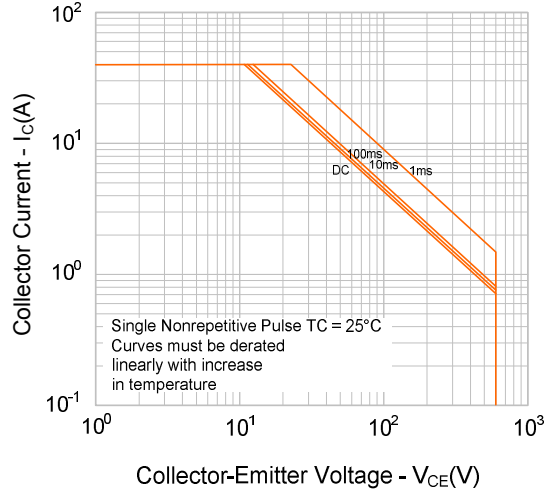
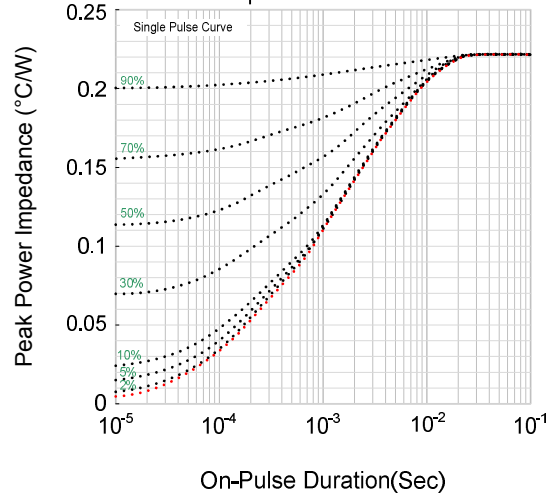
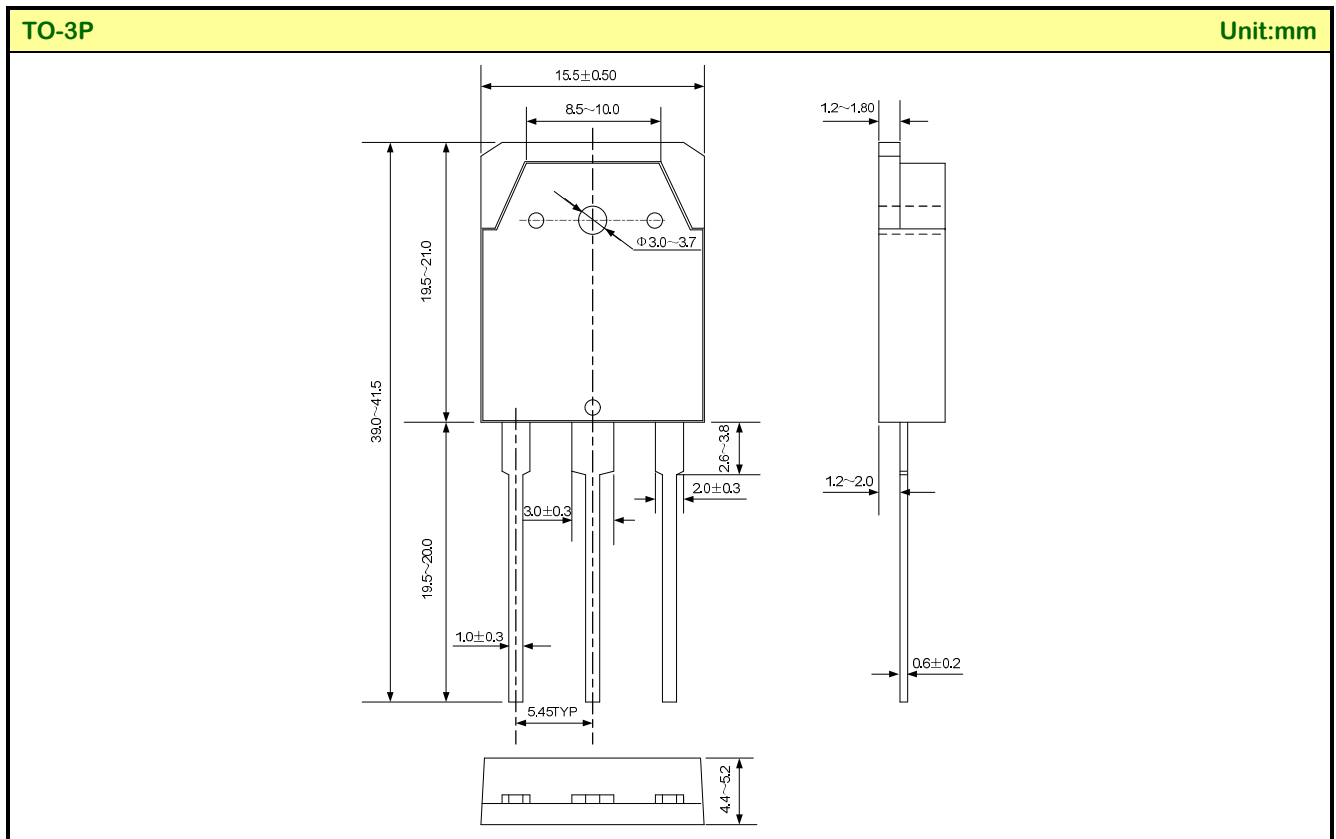


Figure 14. Transient Thermal Impedance of IGBT



**PACKAGE OUTLINE**



**Disclaimer :**

- Silan reserves the right to make changes to the information herein for the improvement of the design and performance without further notice! Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current.
- All semiconductor products malfunction or fail with some probability under special conditions. When using Silan products in system design or complete machine manufacturing, it is the responsibility of the buyer to comply with the safety standards strictly and take essential measures to avoid situations in which a malfunction or failure of such Silan products could cause loss of body injury or damage to property.
- Silan will supply the best possible product for customers!

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Rev.: 1.3

Revision History:

1. Modify the Max Value of Junction Temperature
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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
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