



SANYO Semiconductors

# DATA SHEET

An ON Semiconductor Company

## TIG111BF — N-Channel Non Punch Through IGBT High Power High Speed Switching Applications

### Features

- Low-saturation voltage
- Ultrahigh speed switching
- Enhancement type

### Specifications

Absolute Maximum Ratings at Ta=25°C, Unless otherwise specified

Parameter	Symbol	Conditions	Ratings	Unit	
Collector-to-Emitter Voltage	V <sub>CES</sub>		600	V	
Gate-to-Emitter Voltage	V <sub>GES</sub>		±30	V	
Collector Current (DC)	I <sub>C</sub> *1	Limited by T <sub>jmax</sub>	@T <sub>c</sub> =25°C	23	A
			@T <sub>c</sub> =100°C	11	A
Collector Current (Pulse)	I <sub>CP</sub>	Pulse width Limited by T <sub>jmax</sub>	92	A	
Allowable Power Dissipation	P <sub>D</sub>		2	W	
		T <sub>c</sub> =25°C	60	W	
Junction Temperature	T <sub>j</sub>		150	°C	
Storage Temperature	T <sub>stg</sub>		-55 to +150	°C	

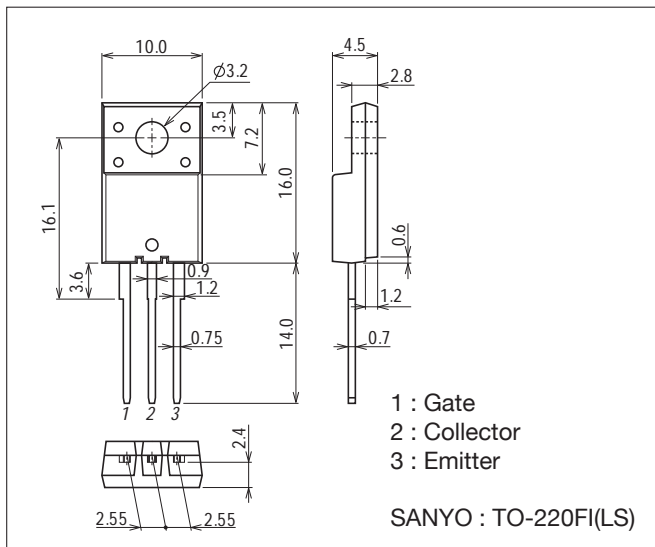
Note : \*1 Collector current is calculated from the following for mula

$$I_C(T_C) = \frac{T_{jmax} - T_C}{R_{th(j-c)} \times V_{CE(sat)max}(T_{jmax}, I_C(T_C))}$$

### Package Dimensions

unit : mm (typ)

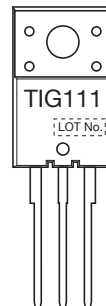
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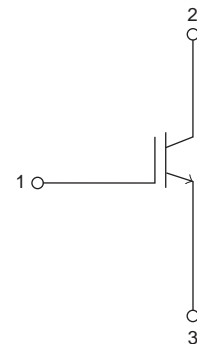
### Product & Package Information

- Package : TO-220FI(LS)
- JEITA, JEDEC : SC-67, SOT-186A, TO-220F
- Minimum Packing Quantity : 100 pcs./bag, 50 pcs./magazine

### Marking



### Electrical Connection



# TIG111BF

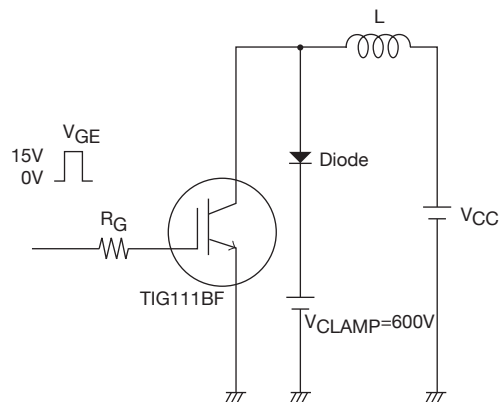
## Electrical Characteristics at $T_j=25^\circ\text{C}$ , Unless otherwise specified

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CES}$	$I_C=1\text{mA}, V_{GE}=0\text{V}$	600			V
Collector-to-Emitter Cutoff Current	$I_{CES}$	$V_{CE}=600\text{V}, V_{GE}=0\text{V}$			100	$\mu\text{A}$
					1	mA
Gate-to-Emitter Leakage Current	$I_{GES}$	$V_{GE}=\pm 30\text{V}, V_{CE}=0\text{V}$			$\pm 100$	nA
Gate-to-Emitter Threshold Voltage	$V_{GE(off)}$	$V_{CE}=10\text{V}, I_C=1\text{mA}$	4.0	5.0	6.0	V
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)1}$	$V_{GE}=15\text{V}, I_C=10\text{A}$		1.6	2.0	V
	$V_{CE(sat)2}$	$V_{GE}=15\text{V}, I_C=25\text{A}$		2.2		V
Input Capacitance	$C_{ies}$	$V_{CE}=30\text{V}, f=1\text{MHz}$		1880		pF
Output Capacitance	$C_{oes}$			30		pF
Reverse Transfer Capacitance	$C_{res}$			22		pF
Turn-ON Delay Time	$t_{d(on)}$			43		ns
Rise Time	$t_r$	$L=200\mu\text{H}, V_{GE}=15\text{V}, I_C=10\text{A}, V_{CC}=300\text{V}, R_g=30\Omega$ , See specified Test Circuit.		25		ns
Turn-ON Time	$t_{on}$			250		ns
Turn-OFF Delay Time	$t_{d(off)}$			175		ns
Fall Time	$t_f$			115		ns
Turn-OFF Time	$t_{off}$			360		ns
Total Gate Charge	$Q_g$				63	
Gate-to-Source Charge	$Q_{gs}$	$V_{CE}=300\text{V}, V_{GE}=15\text{V}, I_C=10\text{A}$		12		nC
Gate-to-Drain "Miller" Charge	$Q_{gd}$			22		nC

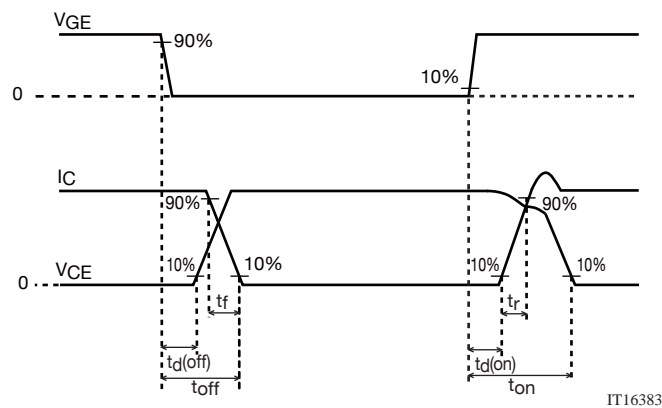
## Thermal Characteristics at $T_a=25^\circ\text{C}$ , Unless otherwise specified

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Thermal Resistance (Junction- Case)	$R_{th(j-c)}$	$T_c=25^\circ\text{C}$			2.08	$^\circ\text{C} / \text{W}$
Thermal Resistance (Junction- at mosphere)	$R_{th(j-a)}$				62.5	$^\circ\text{C} / \text{W}$

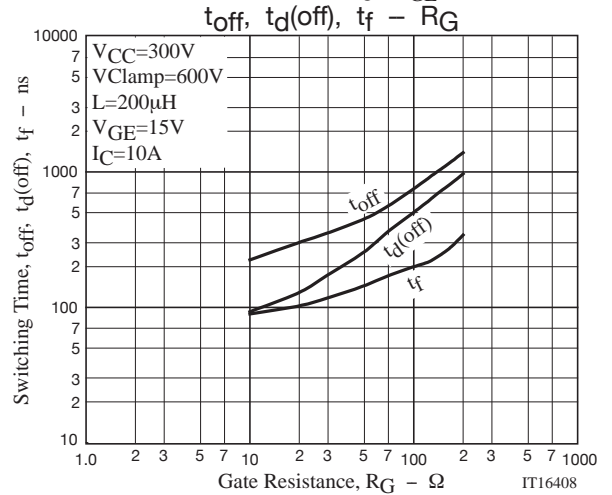
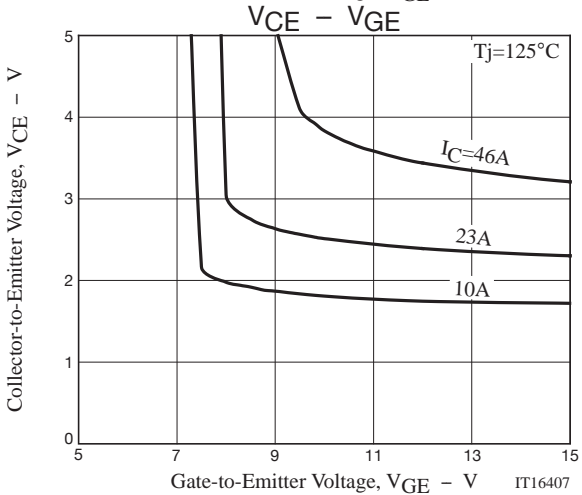
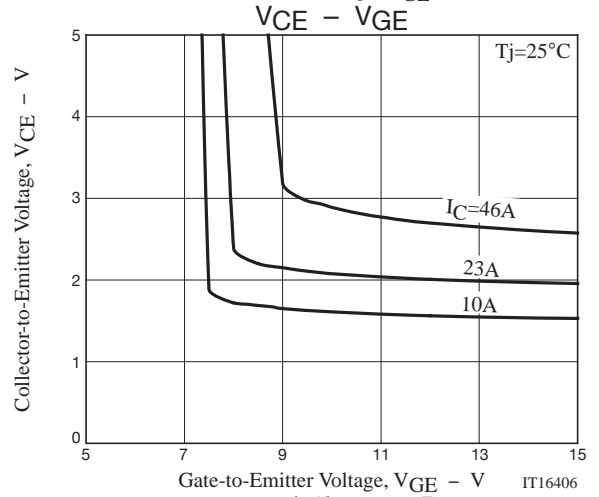
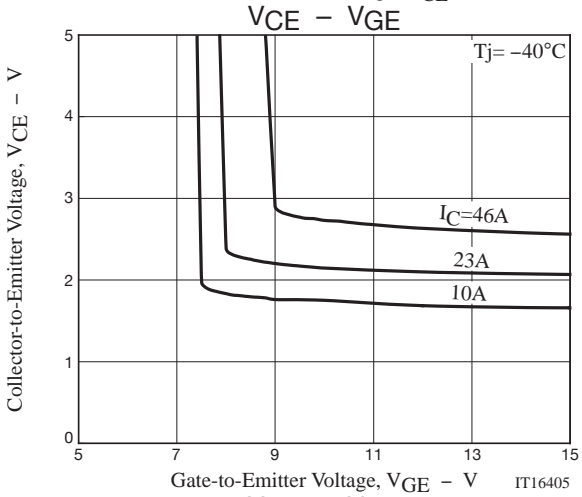
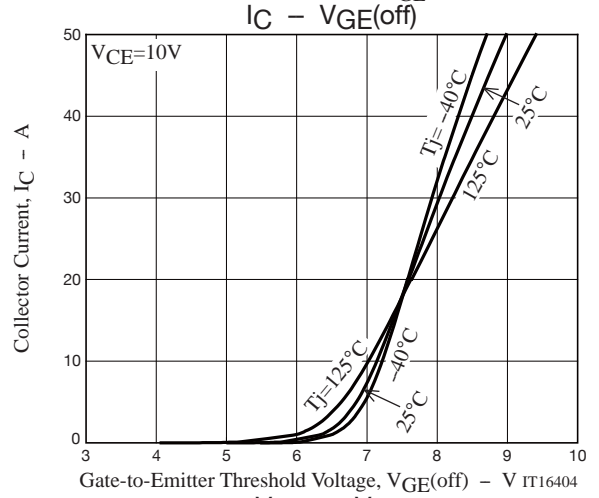
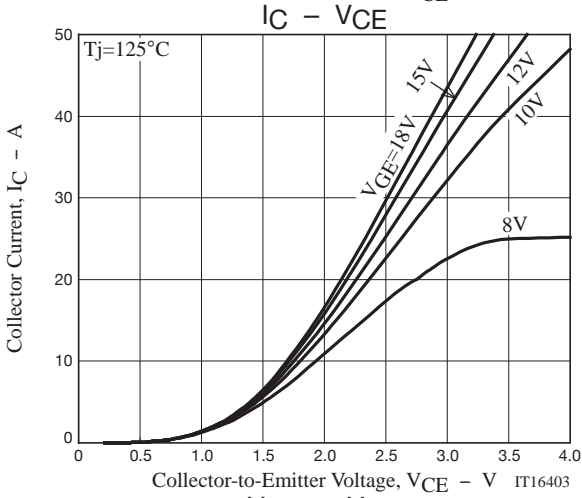
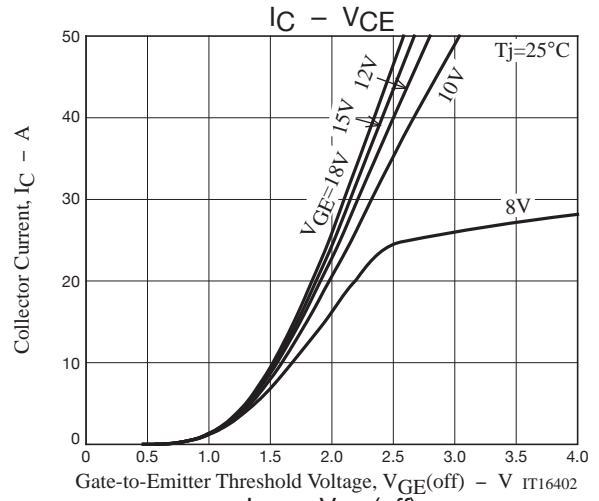
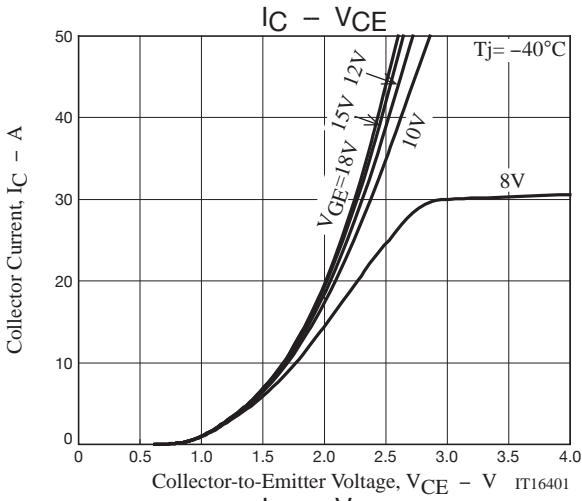
## Switching Time Test Circuit

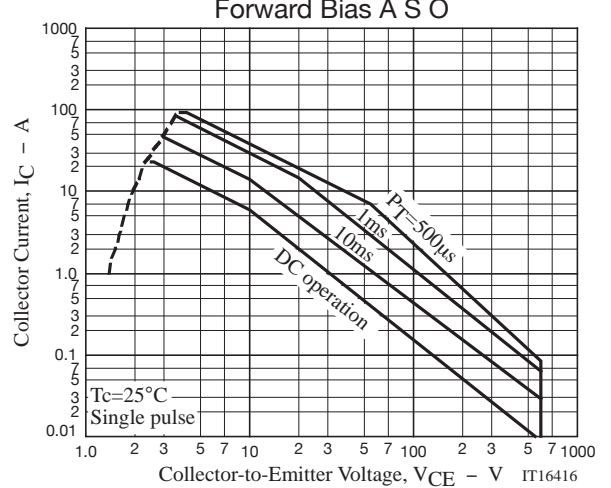
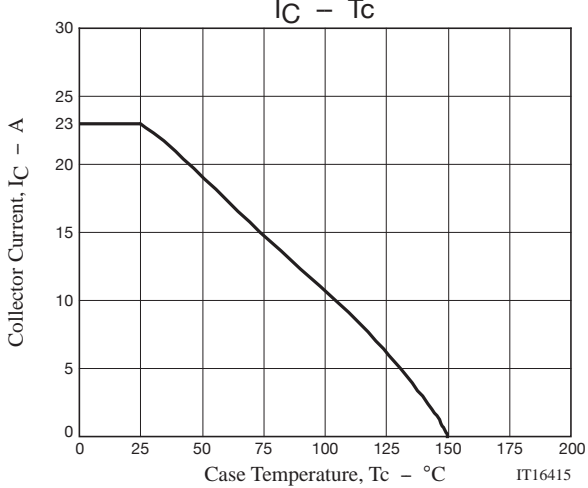
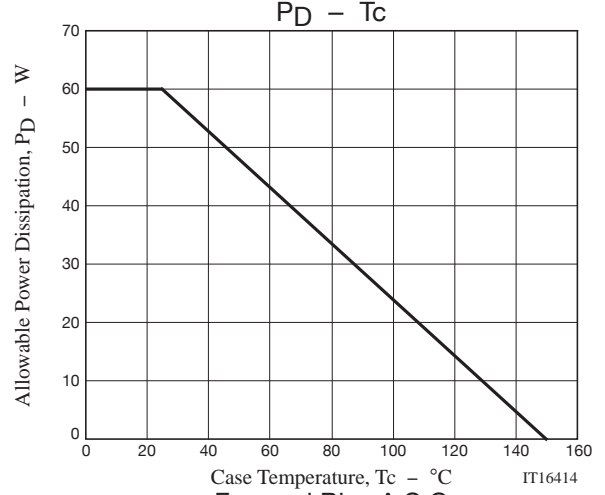
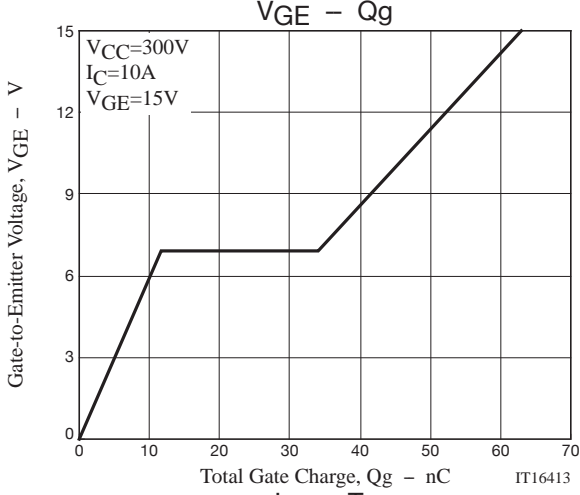
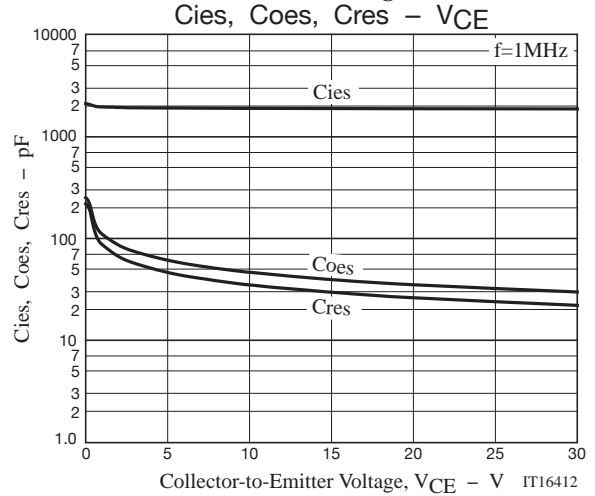
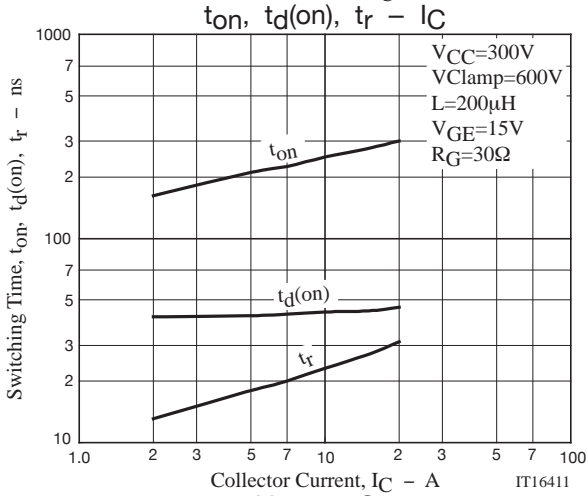
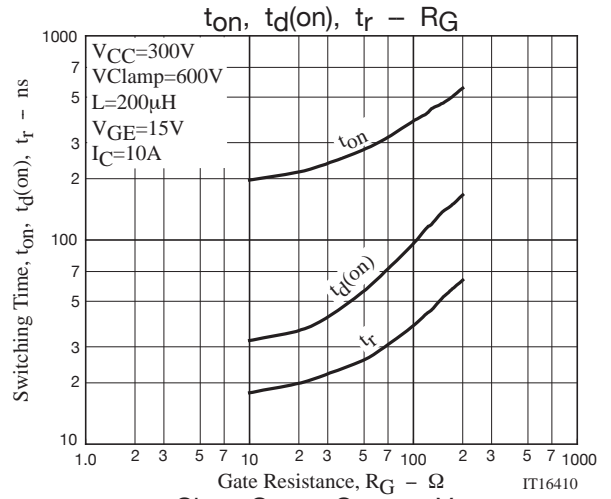
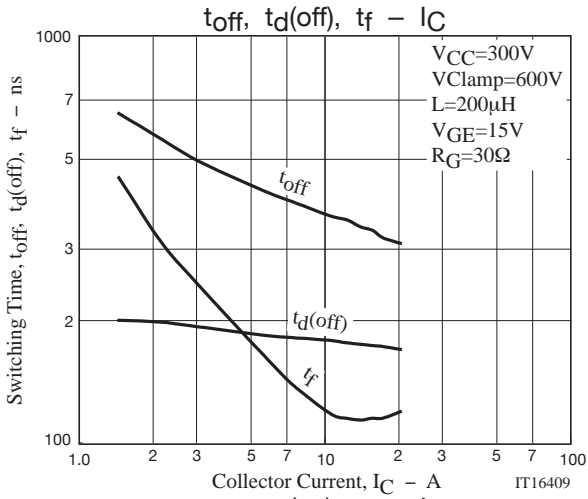


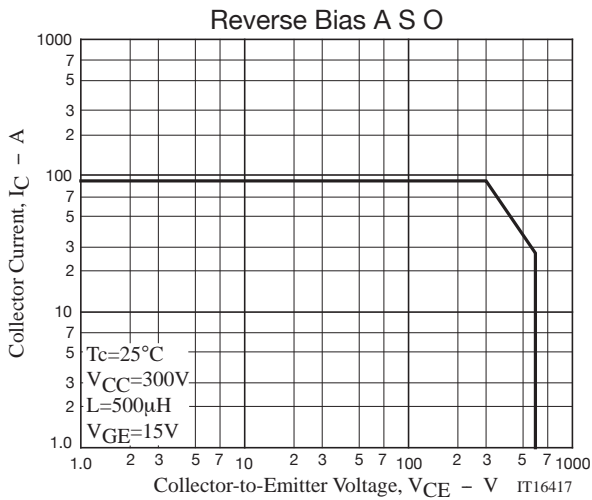
## Timing Chart



# TIG111BF







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