



NGTG12N60TF1G

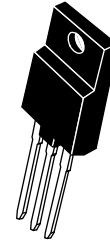
N-Channel IGBT 600V, 12A, V_{CE(sat)};1.4V TO-3PF-3L

ON Semiconductor®

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Features

- V_{CE(sat)}=1.4V typ. (I_C=12A, V_{GE}=15V)
- Low switching loss in higher frequency applications
- Enhancement type
- 5μs short circuit capability
- Adoption of full isolation type package



TO-3PF-3L

Applications

- Power factor correction of white goods appliance
- General purpose inverter

Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit	
Collector to Emitter Voltage	V _{CES}		600	V	
Gate to Emitter Voltage	V _{GES}		±20	V	
Collector Current (DC)	I _C *1	Limited by T _{jmax}	@ T _c =25°C *2	24	A
			@ T _c =100°C *2	12	A
Collector Current (Pulse)	I _{CP}	Pulse width Limited by T _{jmax} (Ref:ASO graph)	88	A	
Allowable Power Dissipation	P _D	T _c =25°C (Our ideal heat dissipation condition) *2	54	W	
Junction Temperature	T _j		150	°C	
Storage Temperature	T _{stg}		- 55 to +150	°C	

Note : *1 Collector Current is calculated from the following formula.

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

*2 Our condition is radiation from backside.

The method is applying silicone grease to the backside of the device and attaching the device to water-cooled radiator made of aluminium.

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Electrical Characteristics at T_a = 25°C, Unless otherwise specified

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector to Emitter Breakdown Voltage	V _{(BR)CES}	I _C =500μA, V _{GE} =0V	600			V
Collector to Emitter Cut off Current	I _{CES}	V _{CE} =600V, V _{GE} =0V	T _c =25°C		10	μA
			T _c =125°C		1	mA
Gate to Emitter Leakage Current	I _{GES}	V _{GE} =±20V, V _{CE} =0V			±100	nA
Gate to Emitter Threshold Voltage	V _{GE(th)}	V _{CE} =20V, I _C =250μA	4.5		6.5	V
Collector to Emitter Saturation Voltage	V _{CE(sat)}	V _{GE} =15V, I _C =12A	T _c =25°C	1.4	1.6	V
			T _c =125°C	1.6		V
Input Capacitance	C _{ies}			2000		pF
Output Capacitance	C _{oes}	V _{CE} =20V, f=1MHz		60		pF
Reverse Transfer Capacitance	C _{res}			50		pF

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ORDERING INFORMATION

See detailed ordering and shipping information on page 7 of this data sheet.

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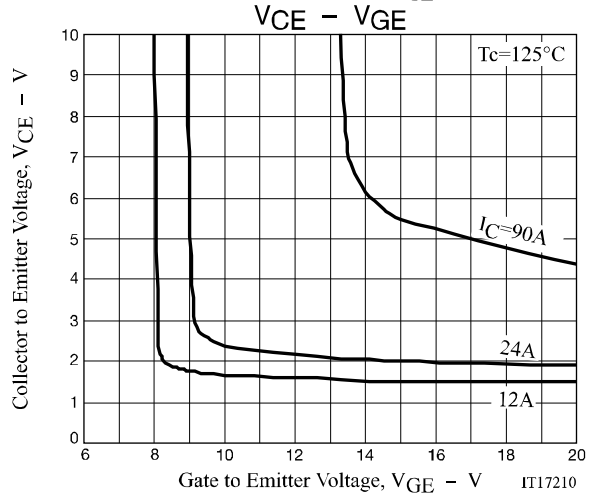
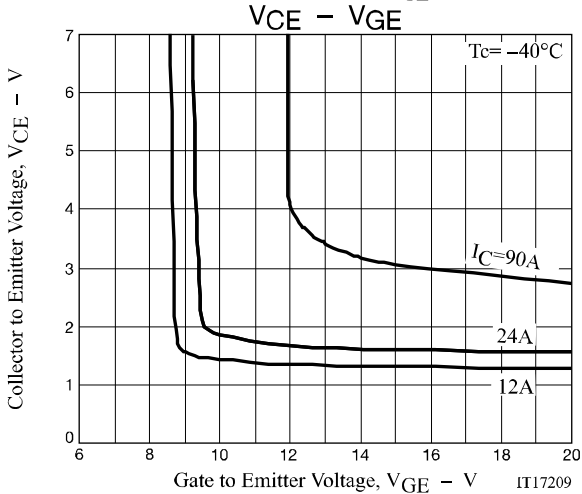
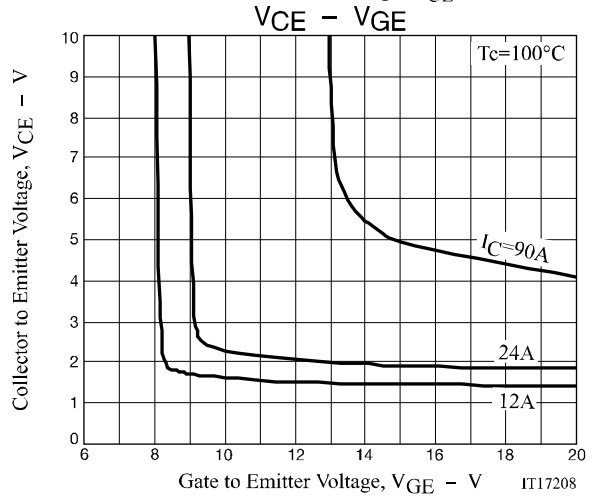
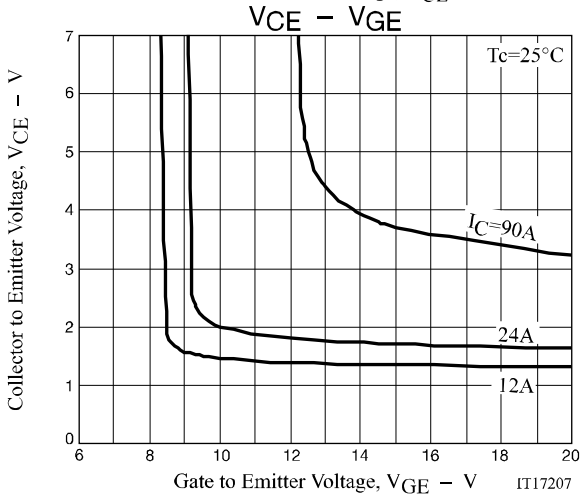
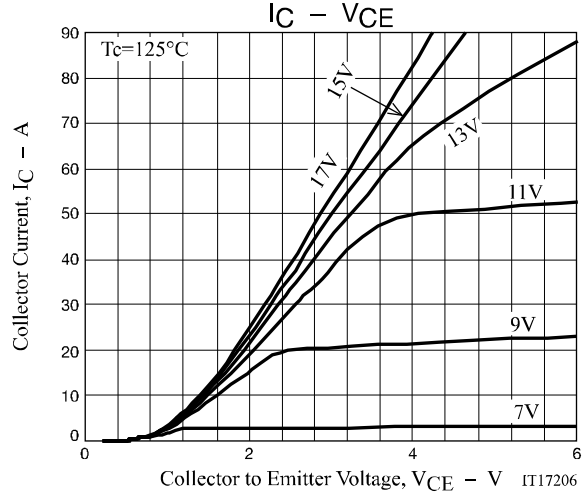
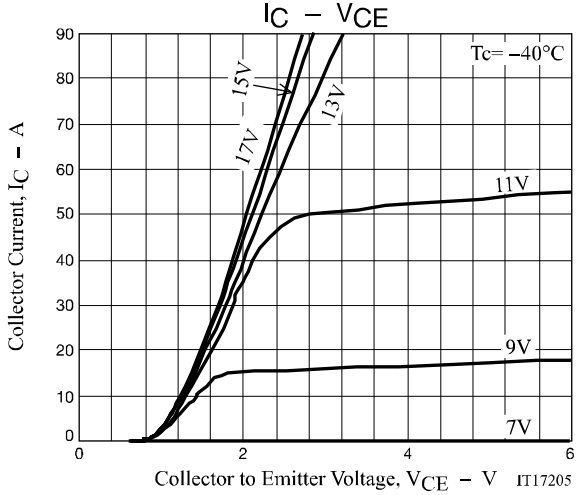
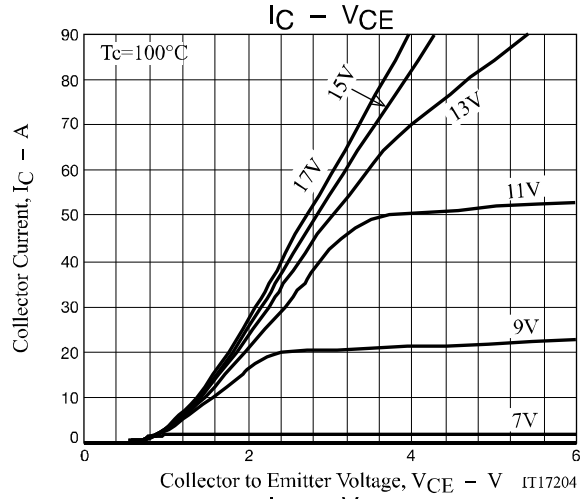
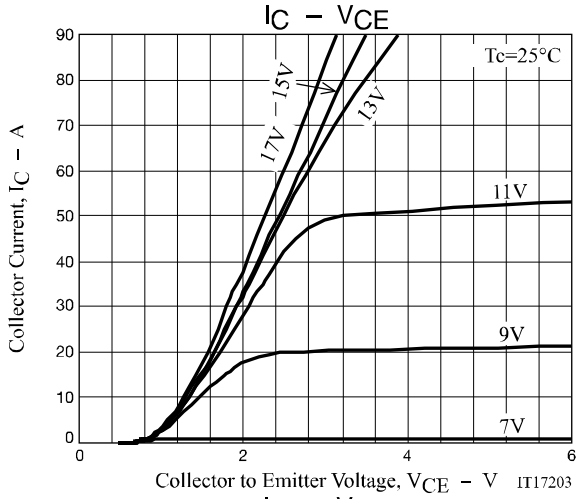
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Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Turn-ON Delay Time	$t_{d(on)}$	$V_{CC}=300V, I_C=15A$ $R_G=30\Omega, L=200\mu H$ $V_{GE}=0V/15V$ $V_{clamp}=400V$ See Fig.1, See Fig.2		55		ns
Rise Time	t_r			30		ns
Turn-ON Time	t_{on}			330		ns
Turn-OFF Delay Time	$t_{d(off)}$			200		ns
Fall Time	t_f			110		ns
Turn-OFF Time	t_{off}			350		ns
Total Gate Charge	Q_g	$V_{CE} =300V, V_{GE}=15V, I_C=15A$		84		nC
Gate to Emitter Charge	Q_{ge}			16		nC
Gate to Collector "Miller" Charge	Q_{gc}			37		nC

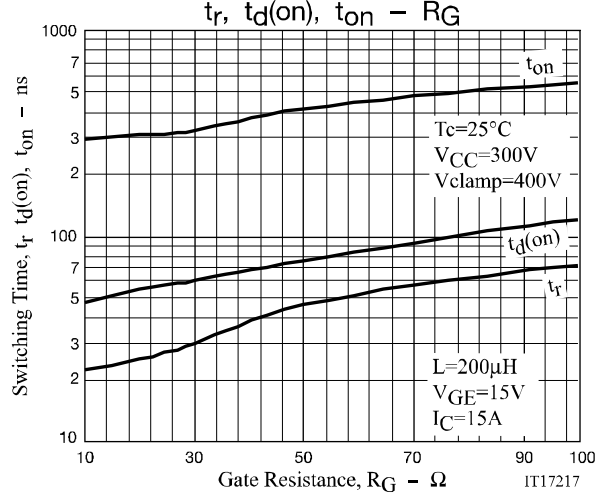
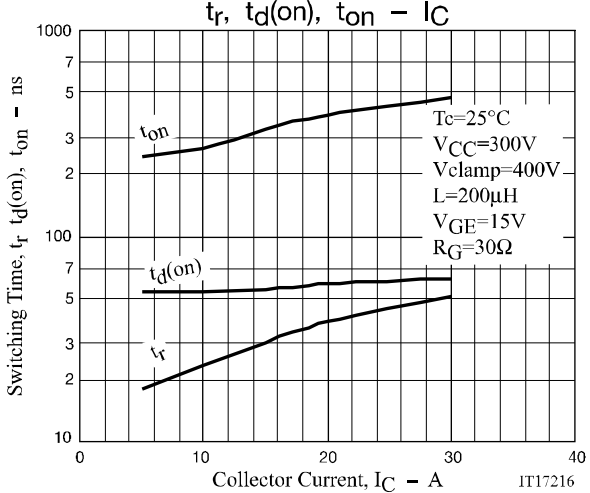
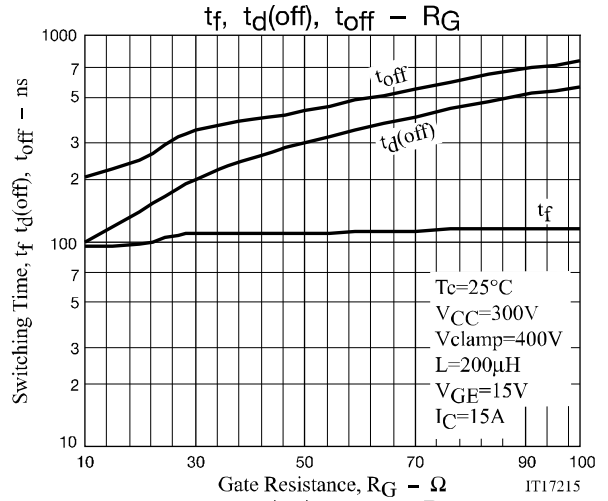
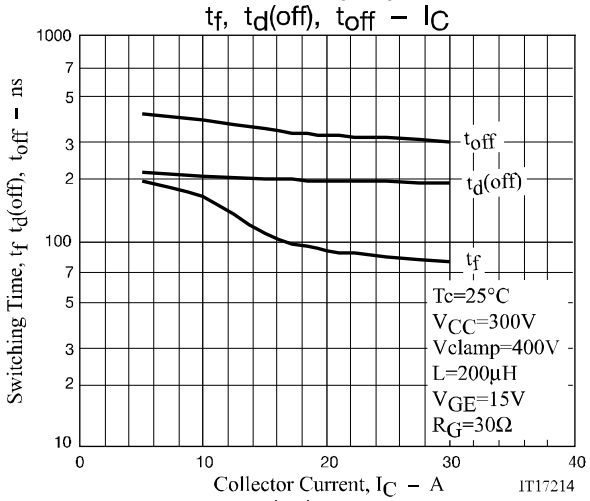
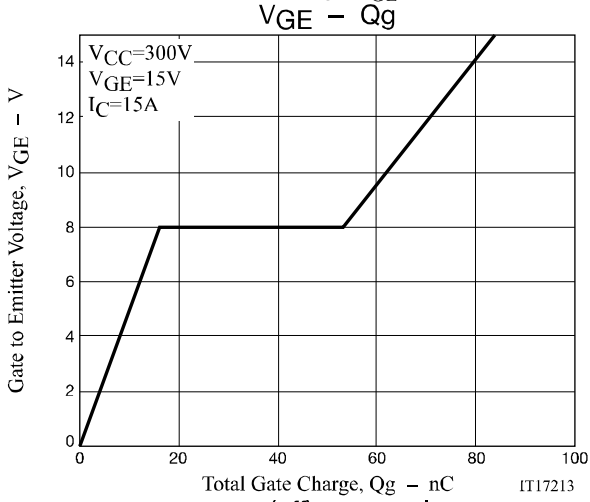
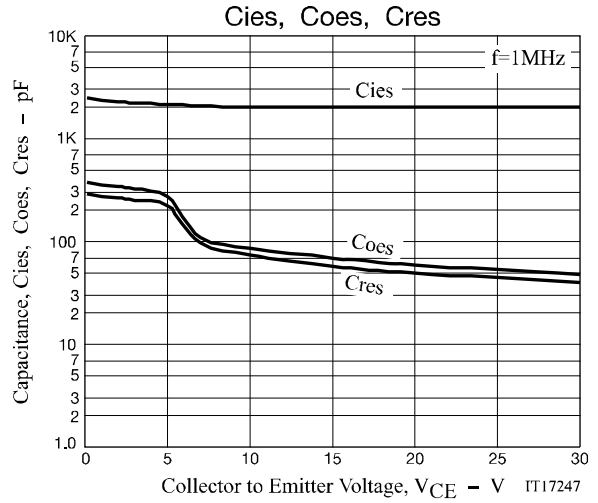
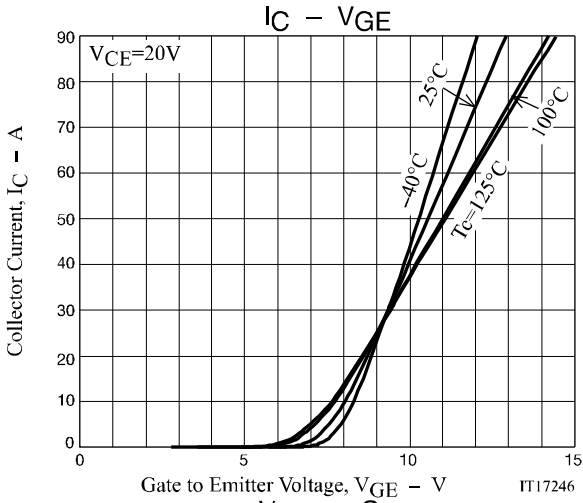
Thermal Characteristics at $T_a = 25^\circ C$, Unless otherwise specified

Parameter	Symbol	Conditions	Ratings	Unit
Thermal Resistance (junction- Case)	$R_{th(j-c)}$	$T_c=25^\circ C$ (our ideal heat dissipation condition)*2	2.33	$^\circ C / W$
Thermal Resistance (junction- atmosphere)	$R_{th(j-a)}$		47.5	$^\circ C / W$

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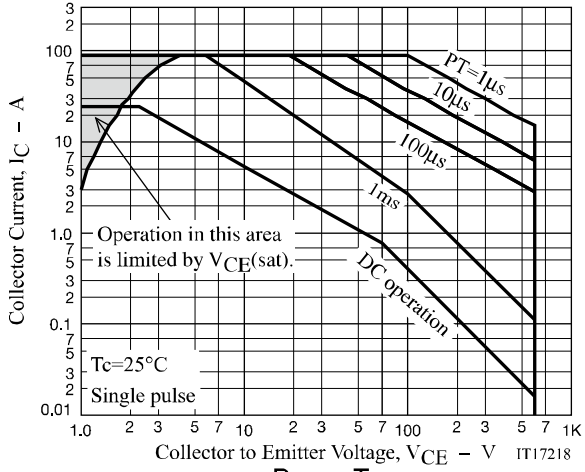


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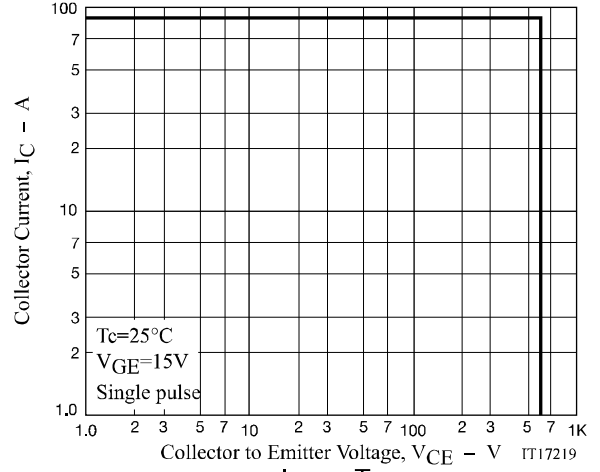


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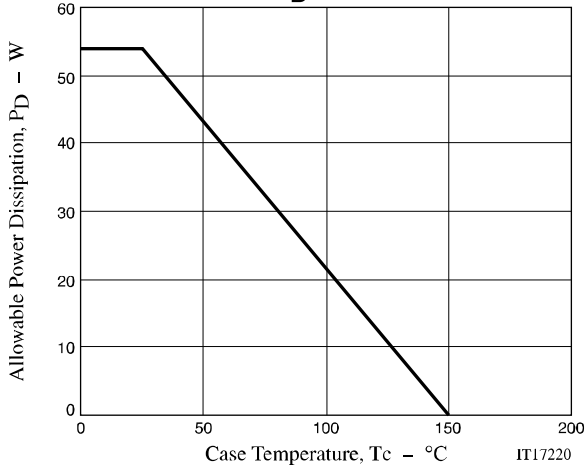
Forward Bias A S O



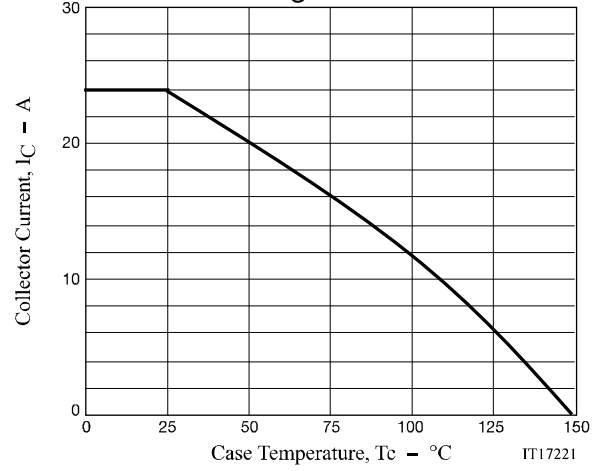
Reverse Bias A S O



P_D - T_c



I_C - T_c



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Ordering & Package Information

Device	Package	Shipping	note
NGTG12N60TF1G	TO-3PF-3L SC-94	30 pcs. / tube	Pb-Free

Marking

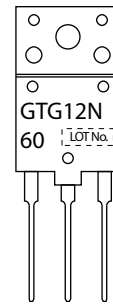


Fig.1 Switching Time Test Circuit

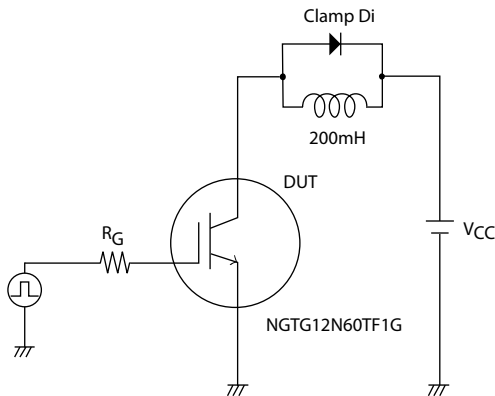
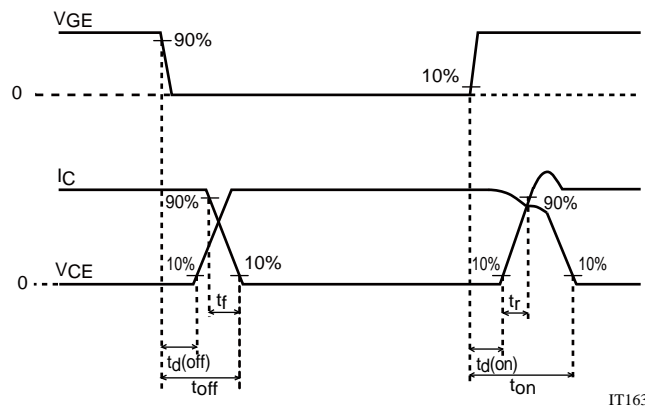


Fig.2 Timing Chart



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