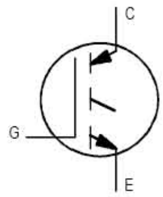
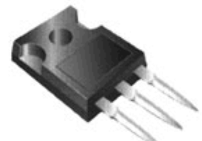
Features

- High short circuit rating optimized for motor control
- Low conduction losses
- High switching speed
- Tighter parameter distribution

V_{CES}=1200 V
$V_{CE(on)\ typ.}$ =3, 0V
@V_{GE} =15V, Ic=40A



N-channel


TO-247AC

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Units	Max
Collector-to-Emitter Voltage	V_{CES}	V	1200
Continuous Collector Current	I_C @ Tc=25˚C		40
Continuous Collector Current	I_C @ Tc=100˚C	A	20
Pulsed Collector Current [1]	I_{CM}		80
Clamped Inductive Load Current [2]	I_{LM}		80
Short Circuit Withstand Time	tsc	µs	10
Maximum Power Dissipation	P_D @ Tc=25˚C	W	180
Maximum Power Dissipation	P_D @ Tc=100˚C		78
Gate–to-Emitter Voltage	V_{GE}	V	±20
Operating Junction and Storage temperature Range	T_J T_{STG}	ºC	-55 to +150
Soldering Temperature, for 10 seconds		ºC	300

THERMAL RESISTANCE

Parameter	Symbol	Units	Min	Typ.	Max
Junction-to-Case	$R_{\Theta JC}$		-	-	0,7
Case-to-Sink, Flat, Greased Surface	$R_{\Theta CS}$	˚C/W	-	0,24	-
Junction-to-Ambient, typical socket mount	$R_{\Theta JA}$		-	-	40

ELECTRICAL CHARACTERISTICS (T_j =25 °C)

Parameter	Symbol	Units	Test Conditions	Min	Typ.	Max
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CES}$	V	V_{GE} = 0V, I_C = 250μA	1200	-	-
Breakdown Voltage Temp.Coefficient	$\Delta V_{(BR)CES}/\Delta T_J$	V/°C	V_{GE} = 0V, I_C = 2 mA	-	0,9	-
Collector-to-Emitter Saturation Voltage	$V_{CE(ON)}$	V	V_{GE} = 15V, I_C = 20A	-	2,5	3,3
			V_{GE} = 15V, I_C = 40A	-	3,0	-
			V_{GE} = 15V, I_C = 20A T_J =150°C	-	2,6	-
Gate Threshold Voltage	$V_{GE(th)}$	V	V_{GE}=V_{CE}, I_C =250 μA	3,0	-	6,0
Threshold Voltage Temp.Coefficient	$\Delta V_{(GE)th}/\Delta T_J$	mV/°C	V_{GE}=V_{CE}, I_C =2mA	-	-10	-
Forward Transconductance	$g_{(fe)}$	S	V_{CE} = 100V, I_C = 20 A	12	18	-
Zero Gate Voltage Collector Current	I_{CES}	μA	V_{CE} = 1200V, V_{GE} =0V	-	-	250
			V_{CE} = 10V, V_{GE} =0V	-	-	2,0
			V_{CE} = 1200V, V_{GE} =0V T_J =150°C	-	-	5000
Gate-to-Emitter Leakage Current	I_{GES}	nA	V_{GS} = ±20V			±100

SWITCHING CHARACTERISTICS (T_j =25 °C)

Parameter	Symbol	Units	Test Conditions	Min	Typ.	Max
Total Gate Charge (turn on)	Q_g	nC	V_{GE} = 15V,V_{CC} = 400V, I_C =20A	-	168	256
Gate-to-Emitter Charge (turn on)	Q_{ge}			-	22	35
Gate-to-Collector Charge (turn on)	Q_{gc}			-	65	102
Turn-On Delay Time	$t_{d(on)}$	ns	V_{CC} =960V, I_C =20A V_{GE} = 15V R_G=24 Ω Energy losses include «tail»	-	30	-
Rise Time	t_r			-	23	-
Turn-Off Delay Time	$t_{d(off)}$			-	180	270
Fall Time	t_f			-	120	178
Turn-On Switching Loss	E_{on}	mJ		-	1,2	-
Turn-Off Switching Loss	E_{off}			-	2,1	-
Total Switching Loss	E_{tS}			-	3,2	4,0
Short Circuit Withstand Time	tsc	μs	Vcc=720V, TJ=125°C VGE=15V RG=5,0Ω	10	-	-
Turn-On Delay Time	$t_{d(on)}$	ns	TJ=150°C V_{CC} =960V, I_C =24A V_{GE} = 15V R_G=24 Ω Energy losses include «tail»	-	32	-
Rise Time	t_r			-	27	-
Turn-Off Delay Time	$t_{d(off)}$			-	370	-
Fall Time	t_f			-	267	-
Total Switching Loss	E_{tS}	mJ		-	7,70	-
Input Capacitance	C_{ISS}	pF	V_{GE} = 0V,V_{CC} = 30V, f = 1.0MHz	-	2600	-
Output Capacitance	C_{OSS}			-	120	-
Reverse Transfer Capacitance	C_{RSS}			-	45	-

Notes:

[1] Repetitive rating; V_{GE} =20V, pulse width limited by max junction temperature.

[2] V_{CC}=80%(V_{CES}), L= 10 μH, V_{GE} = 15V, R_G=5,0 Ω.

[3] Pulse width ≤80 μs, duty factor ≤0,1%.

[4] Pulse width 5,0μs single short.

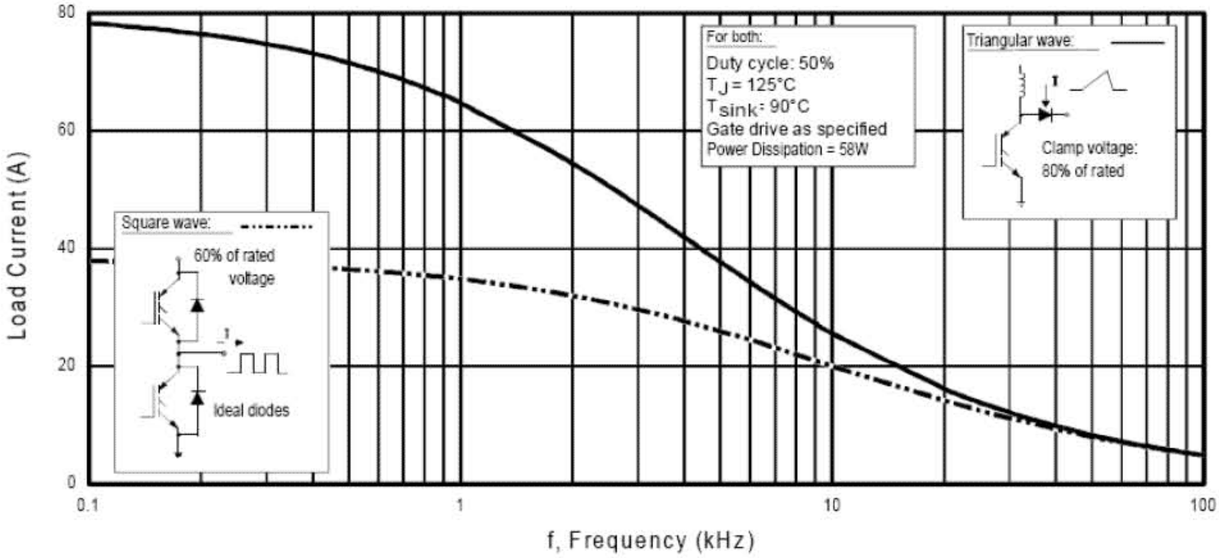


Fig.1 –Typical Load Current vs. Frequency

(For square wave, $I=I_{RMS}$ of fundamental; for triangular wave, $I=I_{PK}$)

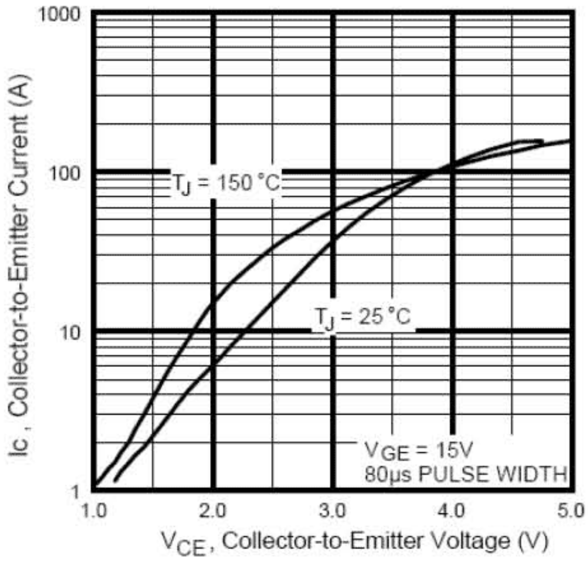


Fig.2 – Typical Output Characteristics

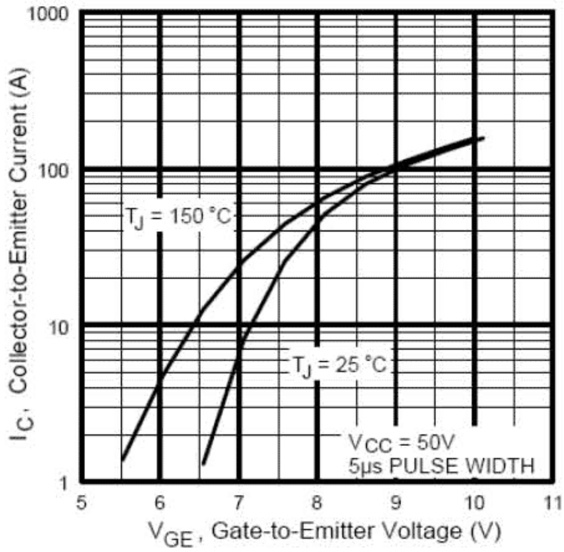


Fig.3 – Typical Transfer Characteristics

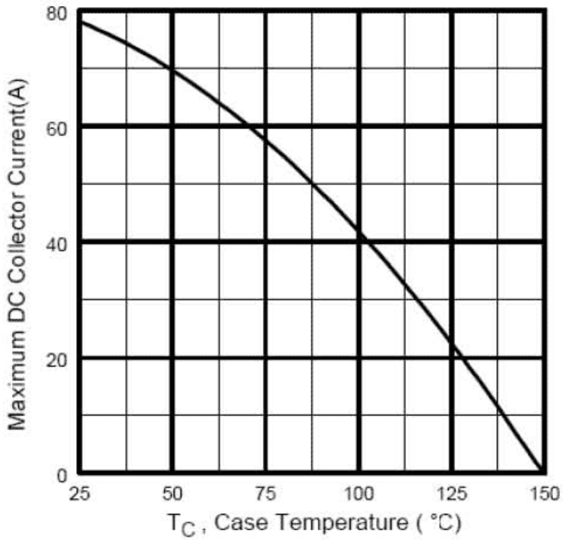


Fig.4 – Maximum Collector Current vs. Case Temperature

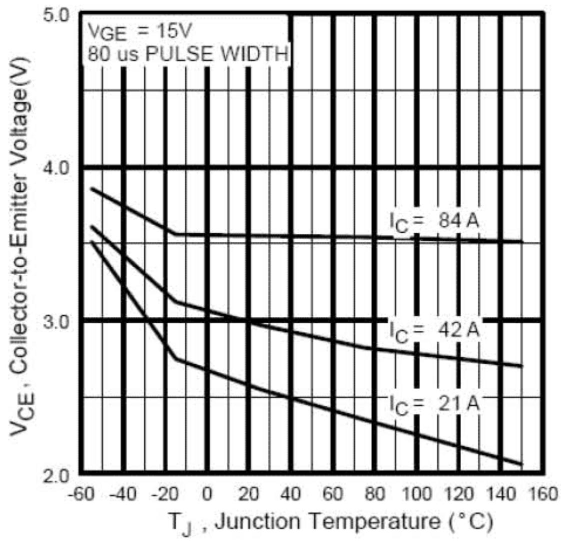


Fig.5 – Collector-to-Emitter Voltage VS. Junction Temperature

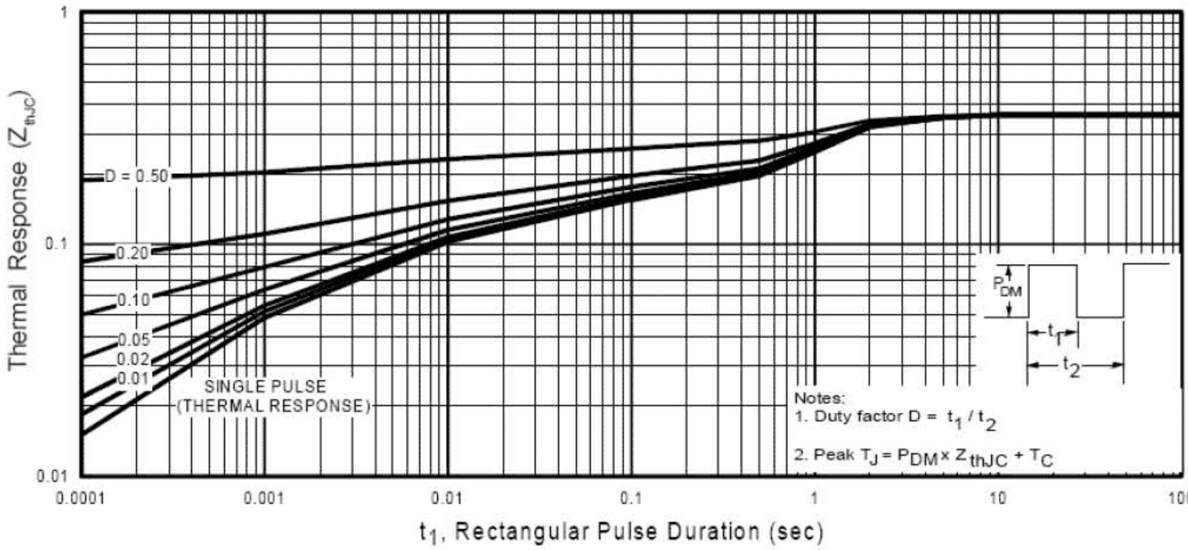


Fig.6 – Maximum Effective Transient Thermal Impedance,Junction-to-Case

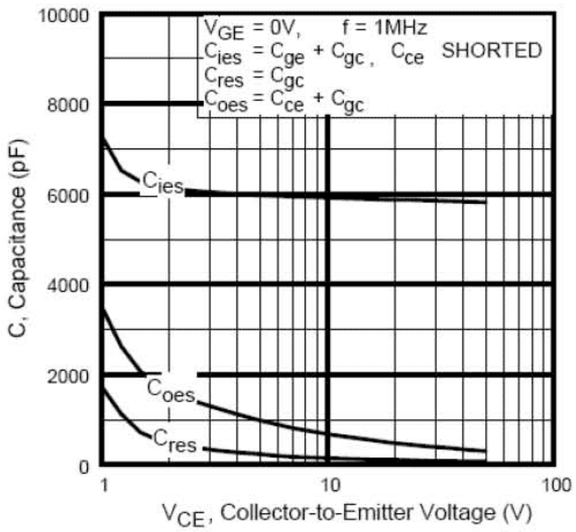


Fig.7 – Typical Capacitance vs. Collector-to-Emitter Voltage

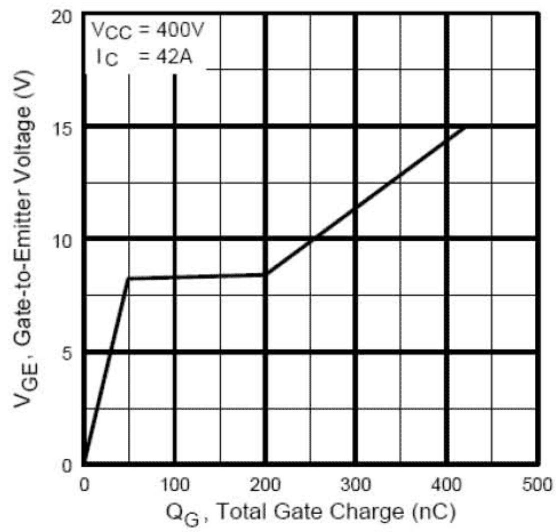


Fig.8 – Typical Gate Charge vs. Gate-to-Emitter Voltage

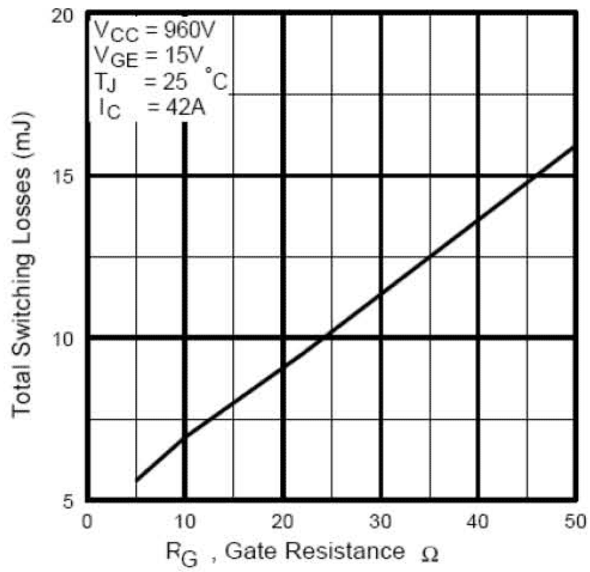


Fig.9 – Typical Switching Losses vs. Gate Resistance

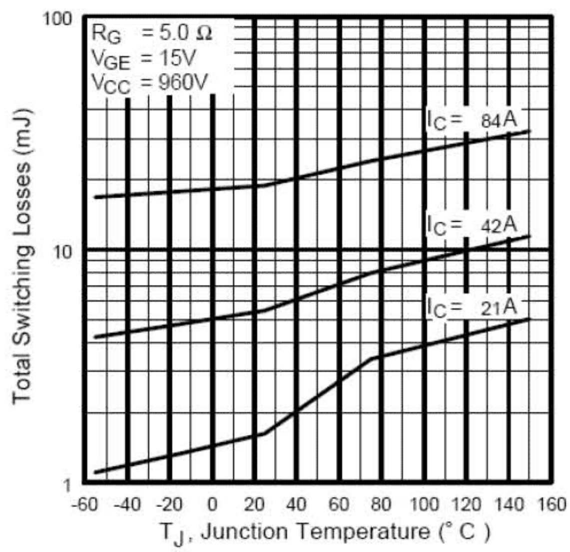


Fig.10 – Typical Switching Losses vs. Junction Temperature

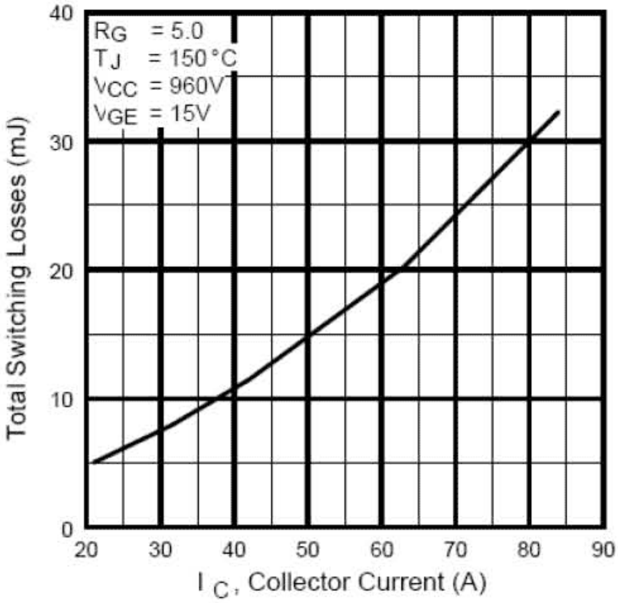


Fig. 11 – Typical Switching Losses vs. Collector-to-Emitter Current

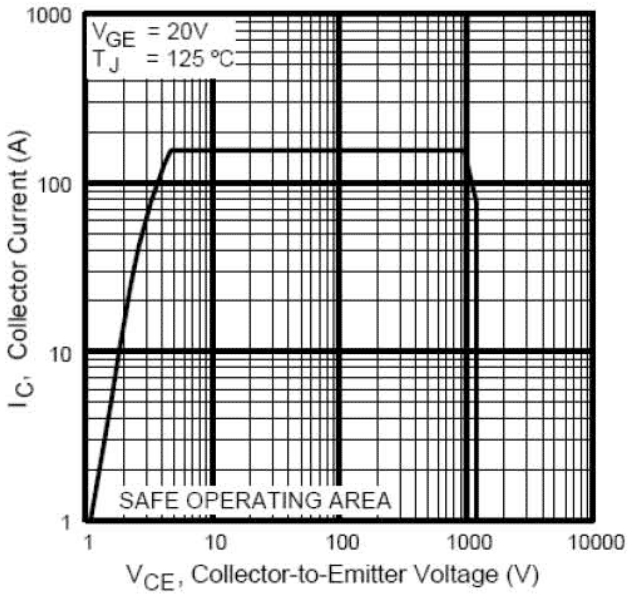
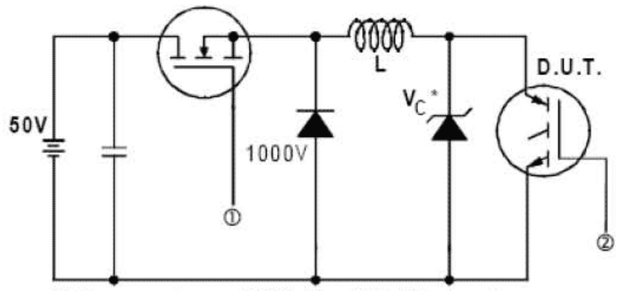


Fig.12-Turn-Off SOA



* Driver same type as D.U.T.; Vc = 80% of Vce(max)
* Note: Due to the 50V power supply, pulse width and inductor will increase to obtain rated Id.

Fig. 13a – Clamped Inductive Load Test Circuit

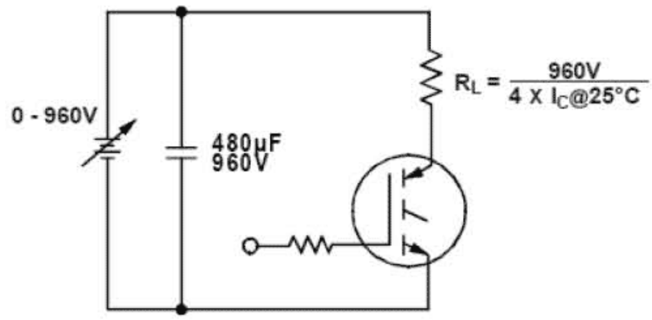


Fig.13b – Pulsed Collector Current Test Circuit

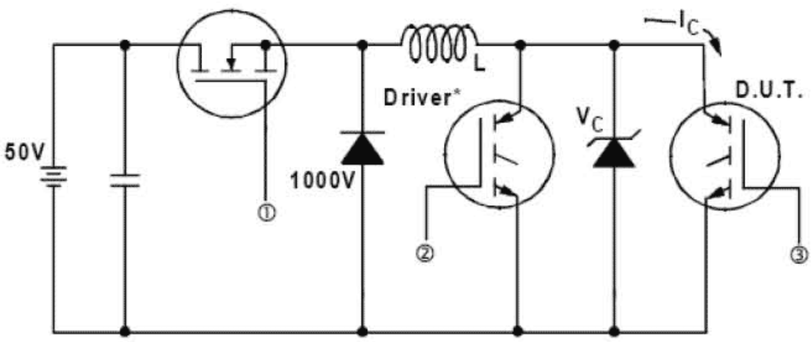


Fig. 14a - Switching Loss Test Circuit

* Driver same type as D.U.T., VC = 960V

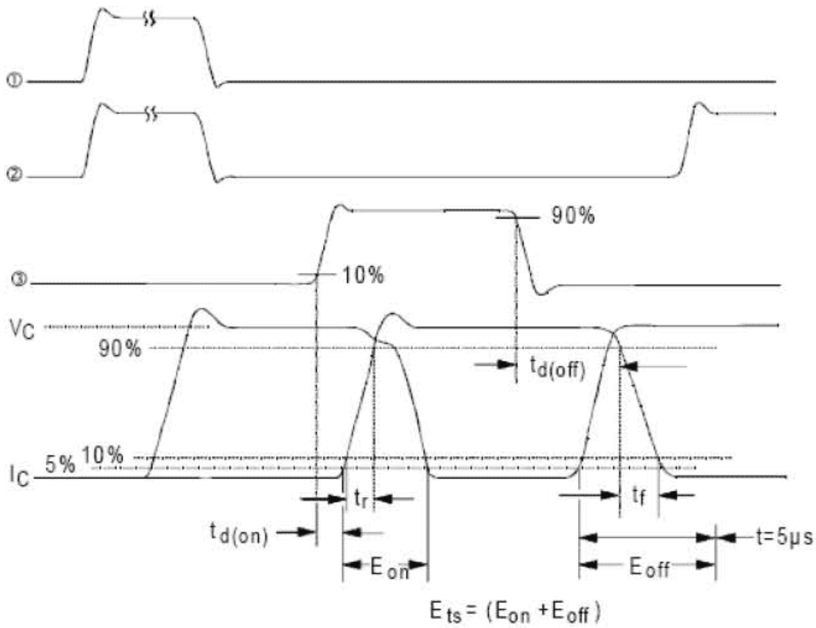


Fig. 14b - Switching Loss Waveforms