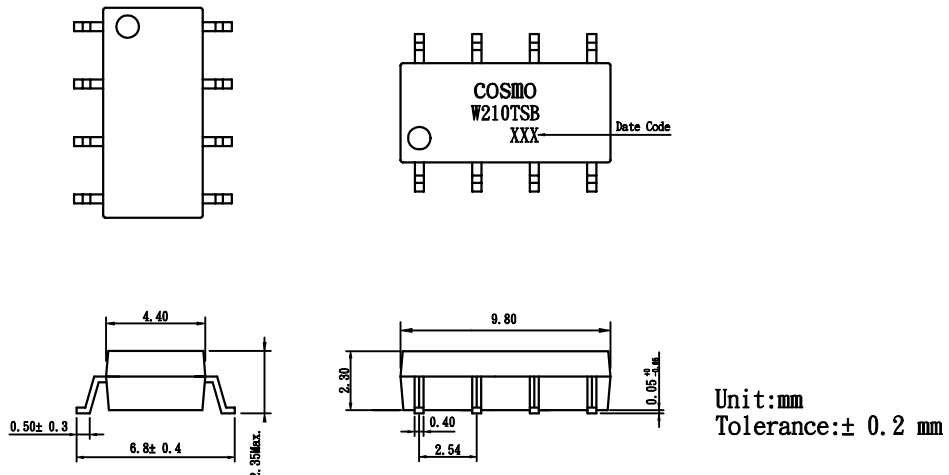


PRODUCT SPECIFICATION

COSMO ELECTRONICS CO., LTD.	PHOTO MOS RELAYS: KAQW210TSB	SHEET 1 OF 10
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• OUTSIDE DIMENSION :



• Turn on/Turn off time



Absolute Maximum Ratings ($T_A=25^\circ\text{C}$)

Emitter (Input)

Reverse Voltage	5.0V
Continuous Forward Current	50mA
Peak Forward Current (1s)	1A
Power Dissipation	100mW
Derate Linearly from 25°C	1.3mW/ $^\circ\text{C}$

Detector (Output)

Output Breakdown Voltage	± 350V
Continuous Load Current	± 130mA
Power Dissipation	500mW

General Characteristics

Isolation Test Voltage	1500VAC _{RMS}
Isolation Resistance	
$V_{10}=500\text{V}, T_A=25^\circ\text{C}$	$\geq 10^{10}\Omega$
Total Power Dissipation	550mW

Derate Linearly from 25°C	2.5mW/ $^\circ\text{C}$
Storage Temperature Range	-40 to +150 $^\circ\text{C}$
Operating Temperature Range	-40 to +85 $^\circ\text{C}$
Junction Temperature	100 $^\circ\text{C}$
Soldering Temperature, 2mm from case, 10 sec.	260 $^\circ\text{C}$

PRODUCT SPECIFICATION

COSMO ELECTRONICS CO., LTD.	PHOTO MOS RELAYS: KAQW210TSB	SHEET 2 OF 10
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Characteristics

(T_A = 25° C)

Description	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Emitter (Input)						
Forward Voltage	V _F		1.2	1.5	V	I _F = 10mA
Operation Input Current	I _{FON}			5	mA	V _L = ± 20V, I _L = 100mA, t = 10 ms
Recovery Input Current	I _{FOFF}	0.05			mA	V _L = ± 20V, I _L = < 5uA
Detector (Output)						
Output Breakdown Voltage	V _B	350			V	I _B = 50uA
Output Off-State Leakage	I _{T(OFF)}		0.7	2	uA	V _T = 100V, I _F = 0mA
I/O Capacitance	C _{ISO}		6		pF	I _F = 0, f = 1MHz
ON Resistance	R _{ON}		28	35	Ω	I _L = 100mA, I _F = 10mA
Turn-on Time	T _{ON}		0.1	0.5	ms	I _F = 10mA, V _L = ± 20V
Turn-off Time	T _{OFF}		0.3	0.5	ms	t = 10ms, I _L = ± 100mA

Mos Relay Schematic and Wiring Diagrams

Type	Schematic	Output configuration	Load	Con- nection	Wiring diagram
KAQW210TSB		1a	AC/DC	-	

PRODUCT SPECIFICATION

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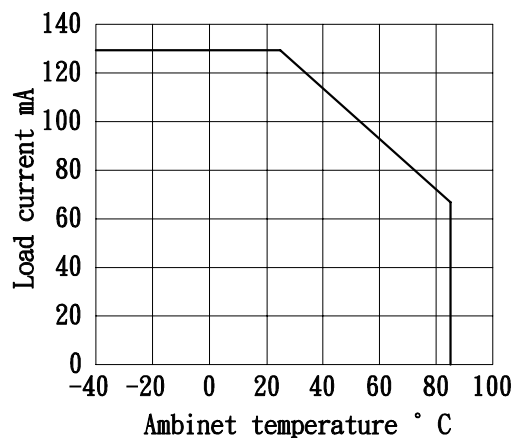
PHOTO MOS RELAYS:

KAQW210TSB

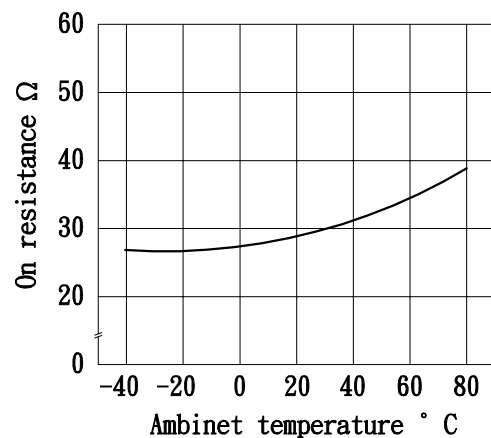
SHEET 3 OF 10

DATA CURVE

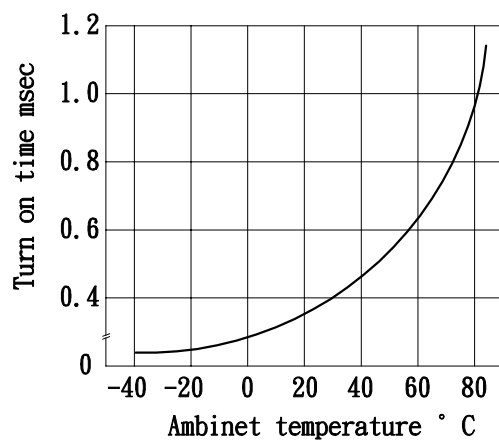
Load current vs. ambient temperature
Allowable ambient temperature:
-40° C+85° C



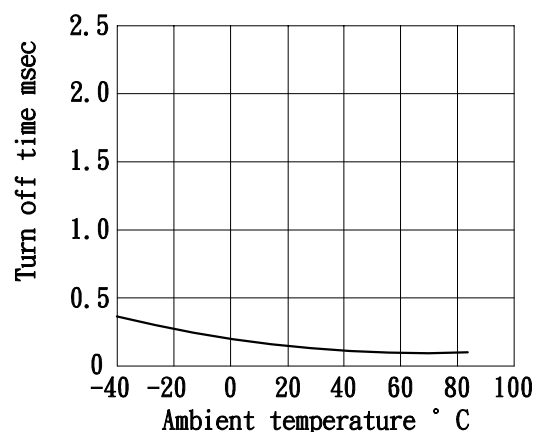
On resistance vs. ambient temperature
Across terminals 7 and 8 pin
LED current: 5mA
Continuous load current: 130 mA(DC)



Turn on time vs. ambient temperature
Load voltage 350 V(DC)
LED current :5mA
Continuous load current: 130mA(DC)



Turn off time vs. ambient temperature
LED current: 5mA; Load voltage: 350V(DC)
Continuous load current: 130mA(DC)



PRODUCT SPECIFICATION

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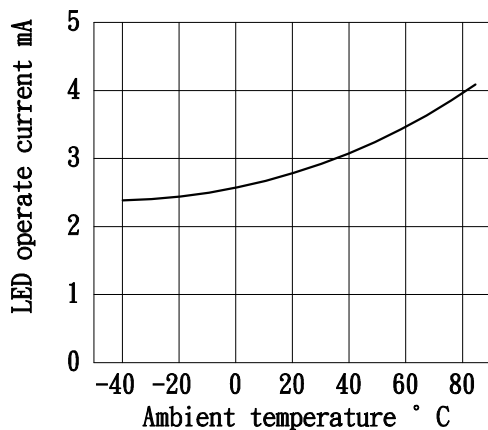
ELECTRONICS CO., LTD.

PHOTO MOS RELAYS:

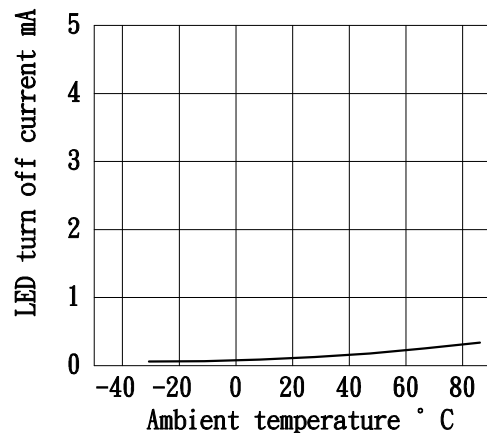
KAQW210TSB

SHEET 4 OF 10

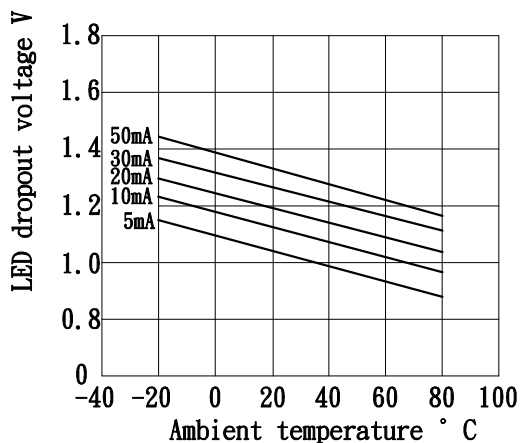
LED operate vs. ambient temperature
Load voltage: 350V(DC)
Continuous load current: 130mA(DC)



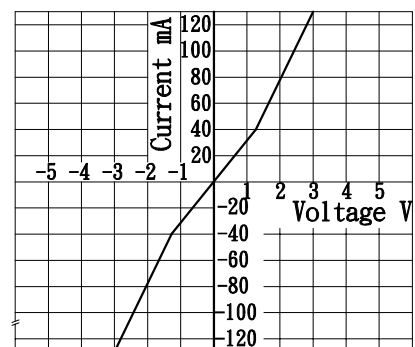
LED turn off current vs. ambient temperature
Load voltage: 350V(DC)
Continuous load current: 130mA(DC)



LED dropout voltage vs. ambient temperature
LED current: 5 to 50mA



Voltage vs. current characteristics of output at MOS FET portion
Measured portion: across terminals 7 and 8 pin
Ambient temperature: 25° C



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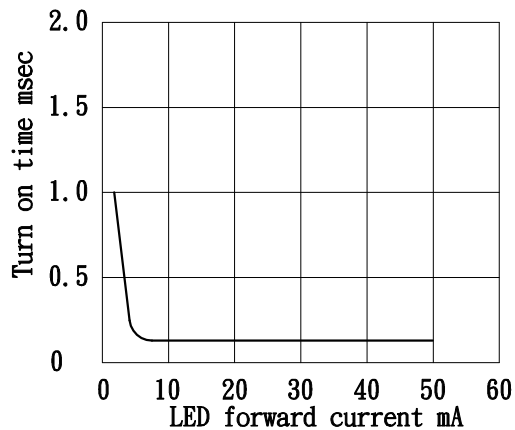
ELECTRONICS CO., LTD.

PHOTO MOS RELAYS:

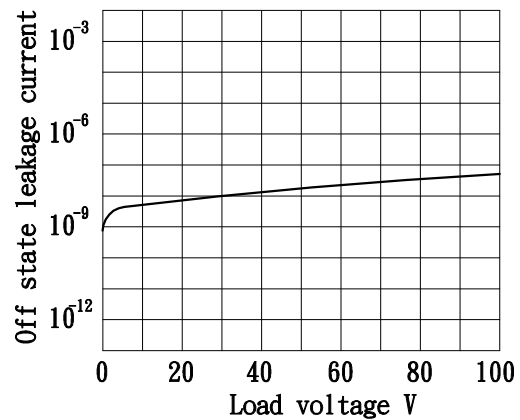
KAQW210TSB

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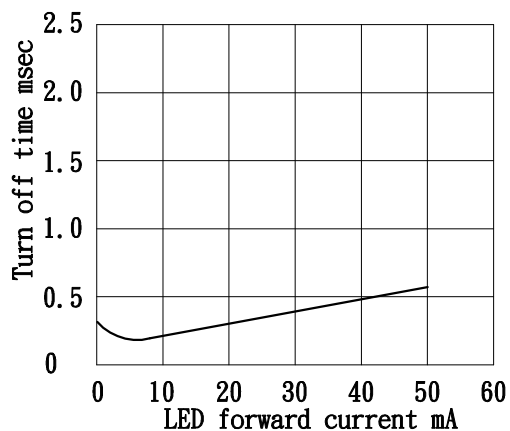
LED forward current vs. turn on time
Across terminals 7 and 8pin; Load voltage: 350V(DC); Continuous load current: 130mA(DC); Ambient temperature: 25° C



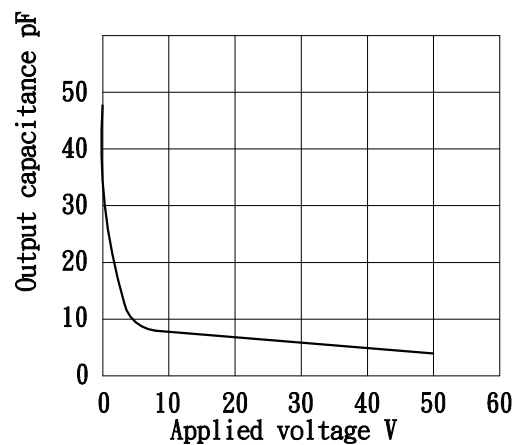
Off state leakage current
Across terminals 7 and 8pin
Ambient temperature: 25° C



LED forward current vs. turn off time
Across terminals 7 and 8pin; Load voltage: 350V(DC); Continuous load current: 130 mA(DC); Ambient temperature: 25° C



Applied voltage vs. output capacitance
Across terminals 7 and 8pin
Frequency: 1MHz; Ambient temperature: 25° C



PRODUCT SPECIFICATION

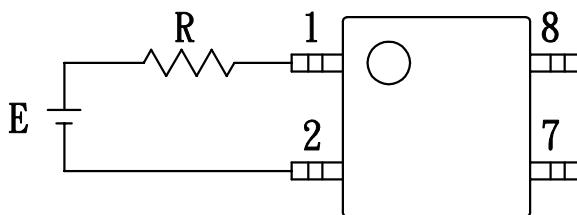
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USING METHODS

Examples of resistance value to
control LED forward current I_F

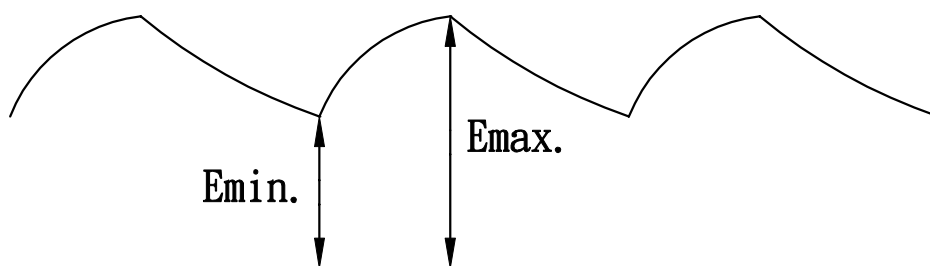
Photo MOSRELAY

($I_F = 5\text{mA}$)



E	R
3.3V	Approx. 240 ohm
5V	Approx. 540 ohm
12V	Approx. 1.8K ohm
15V	Approx. 2.4K ohm
24V	Approx. 4K ohm

- (1) LED forward current must be more than 5mA, at E min.
- (2) LED forward current must be less than 50mA, at E max.

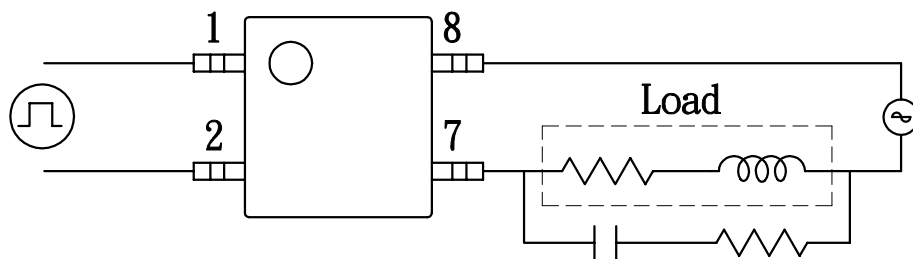
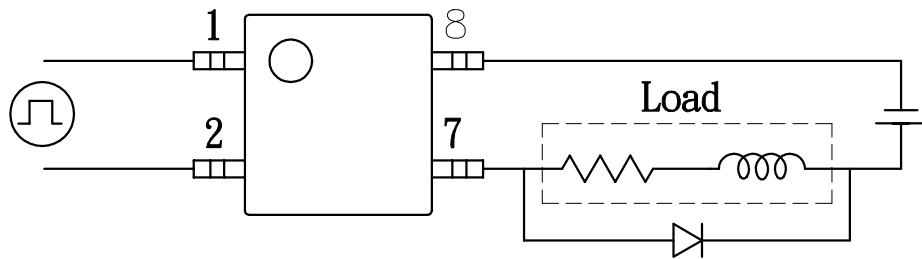


PRODUCT SPECIFICATION

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USING METHODS

Regulate the spike voltage generated on the inductive load as follows



R-C Snubber

PRODUCT SPECIFICATION

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• Absolute Maximum Ratings

(Ta=25°C)

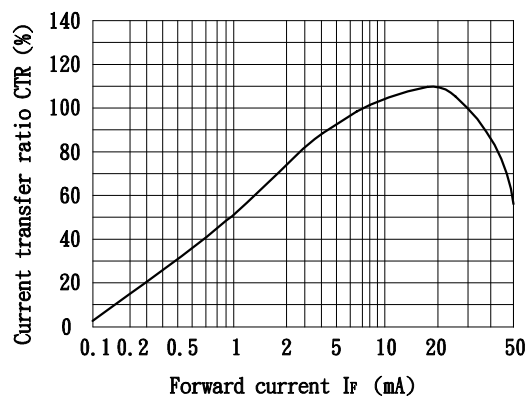
	Parameter	Symbol	Rating	Unit
Input	Forward current	I _F	± 50	mA
	Peak forward current	I _{FM}	± 1	A
	Power dissipation	P _D	70	mW
Output	Collector-emitter voltage	V _{CE0}	60	V
	Emitter-collector voltage	V _{ECO}	6	V
	Collector current	I _c	50	mA
	Collector power dissipation	P _c	150	mW
	Total power dissipation	P _{tot}	200	mW
	Isolation voltage 1 minute	V _{iso}	3750	V _{rms}
	Operating temperature	T _{opr}	-30 to +100	° C
	Storage temperature	T _{stg}	-55 to +125	° C
	Soldering temperature 10 second	T _{sol}	260	° C

• Electro-optical Characteristics

(Ta=25°C)

	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input	Forward voltage	V _F	I _F =± 20mA	-	1.2	1.4	V
	Peak forward voltage	V _{FM}	I _{FM} =± 0.5A	-	-	3.5	V
	Terminal capacitance	C _t	V=0, f=1kHz	-	30	-	pF
Output	Collector dark current	I _{CE0}	V _{CE} =20V, I _F =0	-	-	0.1	uA
	Current transfer ratio	CTR	I _F =± 1mA, V _{CE} =5V	30	100	-	%
Transfer characteristics	Collector-emitter saturation voltage	V _{CE(sat)}	I _F =± 20mA, I _C =1mA	-	0.1	0.3	V
	Isolation resistance	R _{iso}	DC500V	5x10 ¹⁰	10 ¹¹	-	ohm
	Floating capacitance	C _f	V=0, f=1MHz	-	0.6	1.0	pF
	Cut-off frequency	f _c	V _{CC} =5V, I _C =2mA, R _L =100ohm	-	80	-	kHz
	Response time (Rise)	t _r	V _{CC} =2V, I _C =2mA, R _L =100ohm	-	5	20	us
	Response time (Fall)	t _f		-	4	20	us

Fig.1 Current Transfer Ratio vs.
Forward Current



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Fig. 2 Collector Power Dissipation vs. Ambient Temperature

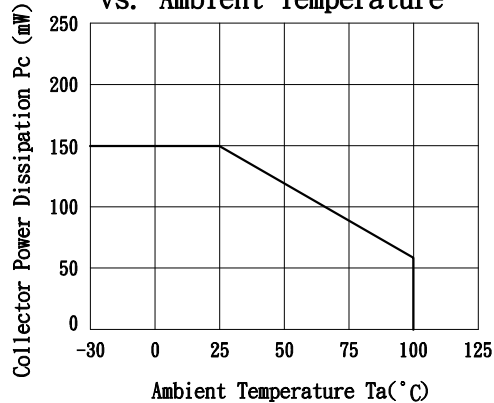


Fig. 3 Collector Dark Current vs. Ambient Temperature

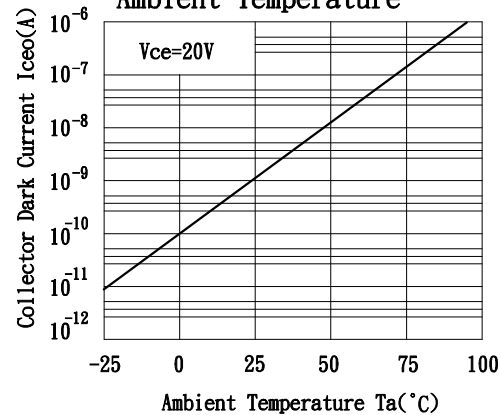


Fig. 4 Forward Current vs. Ambient Temperature

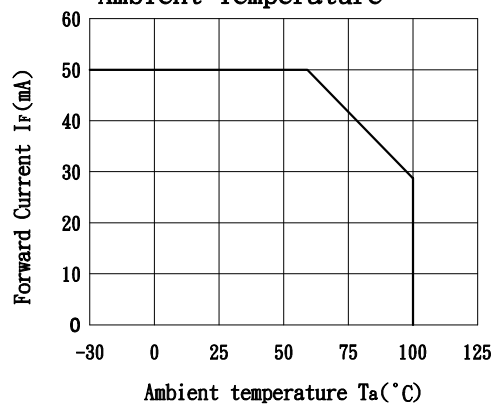


Fig. 5 Forward Current vs. Forward Voltage

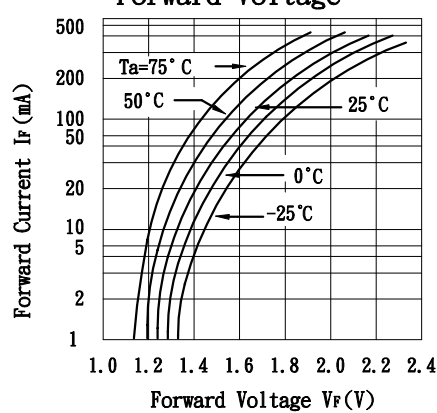


Fig. 6 Collector Current vs. Collector-emitter Voltage

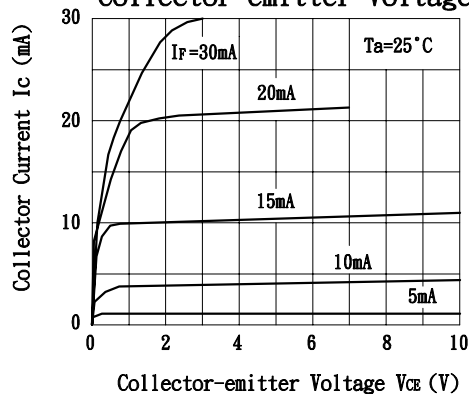
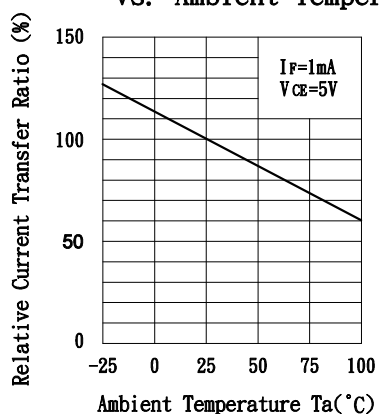


Fig. 7 Relative Current Transfer Ratio vs. Ambient Temperature



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Fig. 8 Collector-emitter Saturation Voltage vs. Ambient Temperature

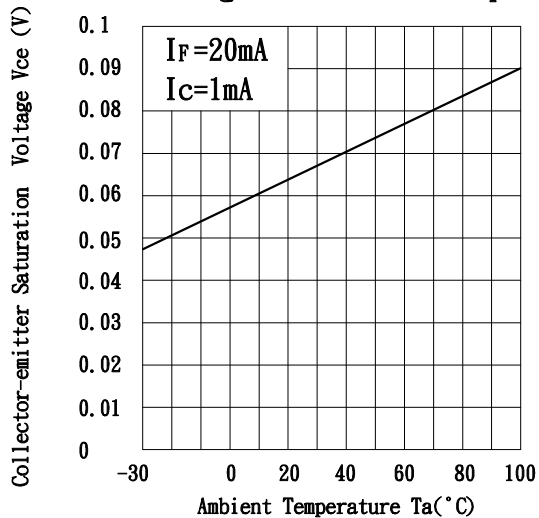


Fig. 9 Collector-emitter Saturation Voltage vs. Forward Current

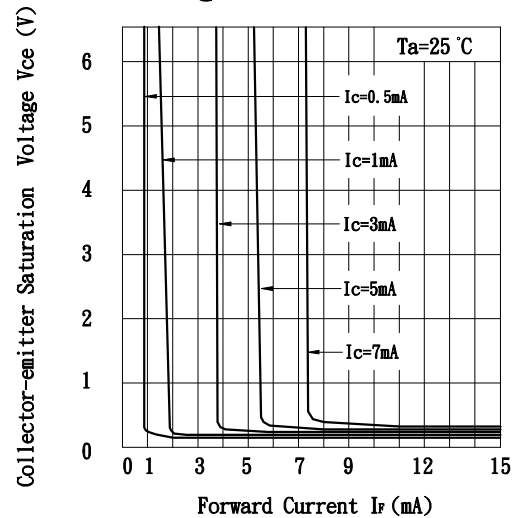


Fig. 10 Response Time vs. Load Resistance

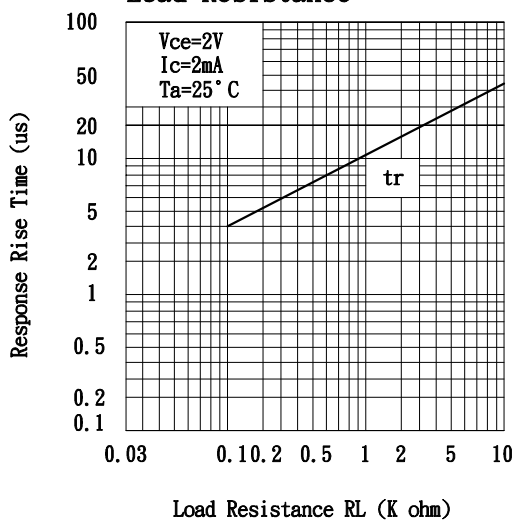


Fig. 11 Response Time vs. Load Resistance

