

PS7241C-AT1, PS7241C-AT5

CURRENT LIMIT TYPE
8-PIN SOP OCMOS FET
(2-ch OCMOS FET)

DESCRIPTION

The PS7241C-AT1 and PS7241C-AT5 are solid state relays containing a GaAs LED on the light emitting side (input side), MOS FETs including current control circuit, Photo transistor on the output side. Current control circuit of OCMOS FET protects this device from thermal breakdown and output circuit.

They are suitable for analog signal control because of their low offset and high linearity.

FEATURES

- 2 channel type (OCMOS FET + Photocoupler)
- Limit current ($I_{LMT} = 125$ to 180 mA)
- Low LED operating current ($I_F = 2$ mA)
- Designed for AC/DC switching line changer
- ★ • Small and thin package (8-pin SOP, Height = 2.1 mm)
- Low offset voltage
- Ordering number of taping product: PS7241C-AT1-F3, F4, PS7241C-AT5-F3, F4
- UL approved: File No. E72422 (S)

APPLICATIONS

- Exchange equipment
- Measurement equipment
- FA/OA equipment

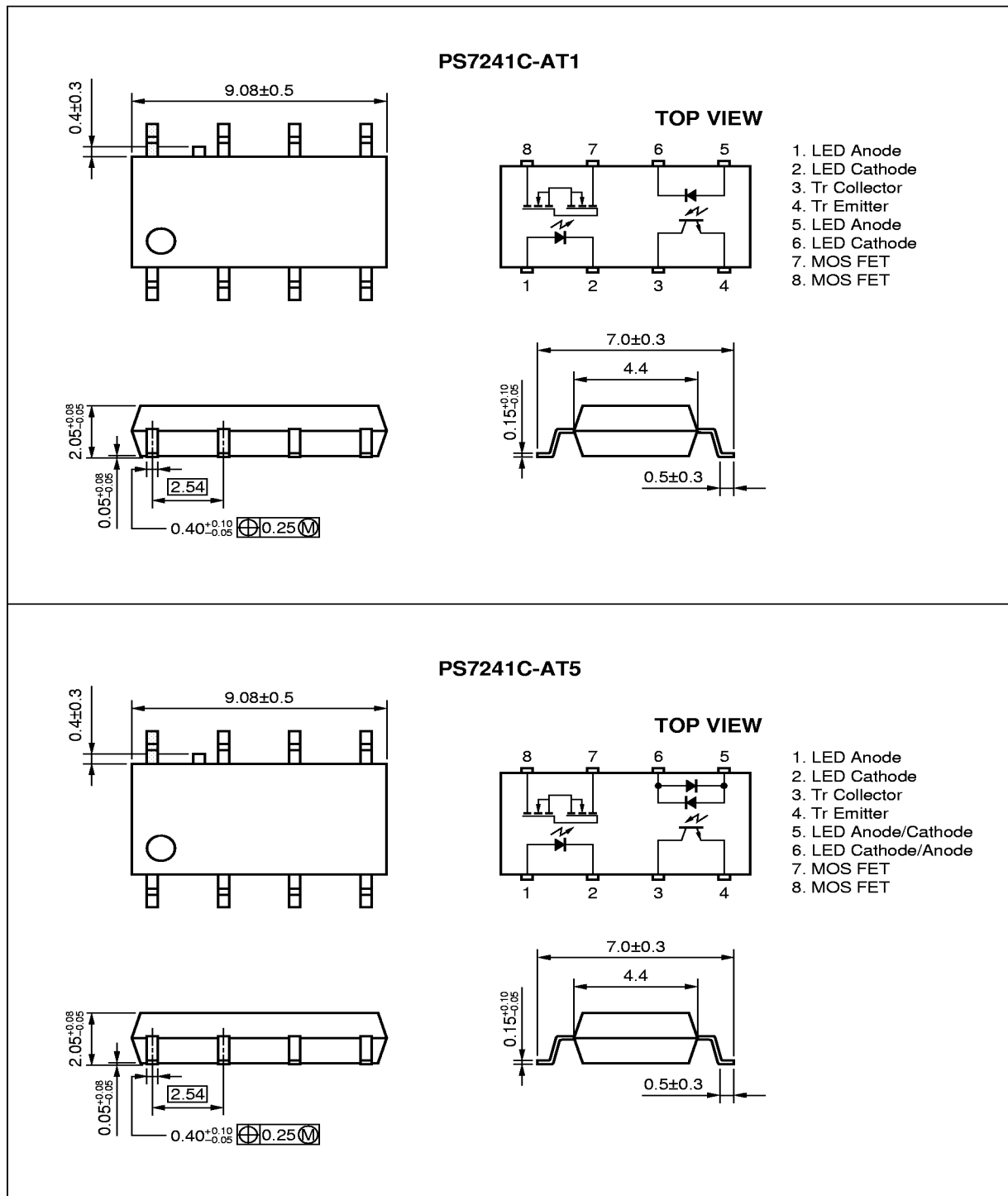
★ ORDERING INFORMATION

Part Number	Package	Packing Style	Application Part Number ^{*1}
PS7241C-AT1	8-pin SOP	Magazine case 45 pcs	PS7241C-AT1
PS7241C-AT1-F3		Embossed Tape 1 500 pcs/reel	
PS7241C-AT1-F4			
PS7241C-AT5		Magazine case 45 pcs	PS7241C-AT5
PS7241C-AT5-F3		Embossed Tape 1 500 pcs/reel	
PS7241C-AT5-F4			

*1 For the application of the Safety Standard, following part number should be used.

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Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

★ PACKAGE DIMENSIONS (in millimeters)



ABSOLUTE MAXIMUM RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

Parameter			Symbol	Ratings	Unit
OCMOS FET	Diode	Forward Current (DC)	I _F	50	mA
		Reverse Voltage	V _R	5.0	V
		Power Dissipation	P _D	50	mW
		Peak Forward Current ¹	I _{FP}	1	A
	MOS FET	Break Down Voltage	V _L	400	V
		Continuous Load Current	I _L	120	mA
		Pulse Load Current ² (AC/DC Connection)	I _{LP}	120	mA
		Power Dissipation	P _D	430	mW
Photocoupler	Diode	Forward Current	I _F	50	mA
		Reverse Voltage ³	V _R	5.0	V
		Power Dissipation	P _D	50	mW
		Peak Forward Current ¹	I _{FP}	1	A
	Transistor	Collector to Emitter Voltage	V _{CEO}	40	V
		Emitter to Collector Voltage	V _{ECO}	6	V
		Collector Current	I _C	80	mA
		Power Dissipation	P _C	100	mW
Isolation Voltage ⁴			BV	1 500	Vr.m.s.
Total Power Dissipation			P _T	630	mW
Operating Ambient Temperature			T _A	−40 to +80	°C
Storage Temperature			T _{stg}	−40 to +100	°C

*1 $PW = 100\text{ }\mu\text{s}$, Duty Cycle = 1 %

*2 $PW = 100\text{ ms}$, 1 shot

*3 PS7241C-AT1 only

*4 AC voltage for 1 minute at $T_A = 25\text{ }^{\circ}\text{C}$, RH = 60 % between input and output

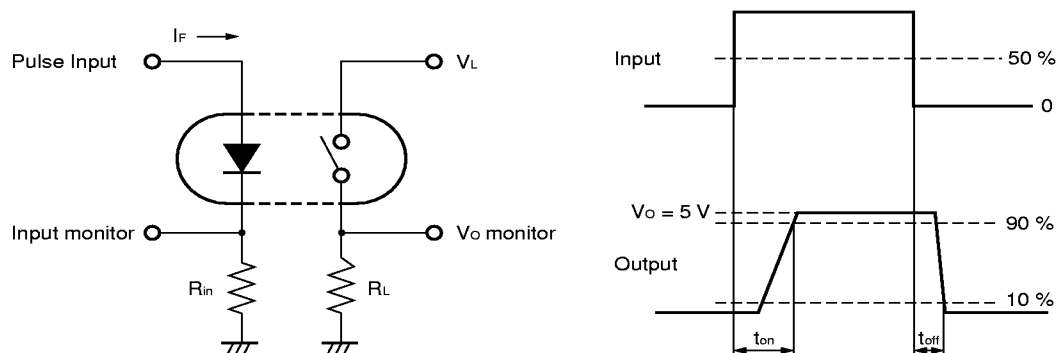
★ **RECOMMENDED OPERATING CONDITIONS ($T_A = 25\text{ }^{\circ}\text{C}$)**

Parameter		Symbol	MIN.	TYP.	MAX.	Unit
OCMOS FET	LED Operating Current	I_F	2	10	20	mA
	LED Off Voltage	V_F	0		0.5	V

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

Parameter			Symbol	Conditions	MIN.	TYP.	MAX.	Unit
OCMOS FET	Diode	Forward Voltage	V _F	I _F = 10 mA		1.2	1.4	V
		Reverse Current	I _R	V _R = 5 V			5.0	μA
	MOS FET	Off-state Leakage Current	I _{Loff}	V _D = 400 V		0.03	1.0	μA
		Output Capacitance	C _{out}	V _D = 0 V, f = 1 MHz		65		pF
	Coupled	LED On-state Current	I _{Fon}	I _L = 120 mA			2.0	mA
		On-state Resistance	R _{on1}	I _F = 10 mA, I _L = 10 mA		28	35	Ω
			R _{on2}	I _F = 10 mA, I _L = 120 mA		24	30	
		Turn-on Time ^{*1}	t _{on}	I _F = 10 mA, V _O = 5 V, PW ≥ 10 ms		0.4	1.0	ms
		Turn-off Time ^{*1}	t _{off}			0.08	1.0	
		Limit Current	I _{LMT}	I _F = 10 mA, V _L = 6 V, t = 5 ms	125	150	180	mA
		Isolation Resistance	R _{I-O}	V _{I-O} = 1.0 kV _{DC}	10 ⁹			Ω
		Isolation Capacitance	C _{I-O}	V = 0 V, f = 1 MHz		0.4		pF
Photo- coupler	Diode	Forward Voltage	V _F	I _F = 10 mA		1.2	1.4	V
		Reverse Current ^{*2}	I _R	V _R = 5 V			5.0	μA
	Transistor	Collector to Emitter Dark Current	I _{CEO}	V _{CE} = 40 V, I _F = 0 mA			100	nA
		Collector to Emitter Breakdown Voltage	BV _{CEO}	I _C = 1 mA	40			V
		Emitter to Collector Breakdown Voltage	BV _{ECO}	I _E = 100 μA	6.0			
	Coupler	Current Transfer Ratio (I _C /I _F)	CTR	I _F = 5 mA, V _{CE} = 5 V	50	200	400	%
		Collector Saturation Voltage	V _{CE(sat)}	I _F = 10 mA, I _C = 2 mA			0.3	V
		Isolation Resistance	R _{I-O}	V _{I-O} = 1.0 kV _{DC}	10 ¹¹			Ω
		Isolation Capacitance	C _{I-O}	V = 0 V, f = 1 MHz		0.4		pF
		Rise Time	t _r	V _{CC} = 5V, I _C = 2 mA, R _L = 100 Ω		3.0		μs
		Fall Time	t _f			5.0		

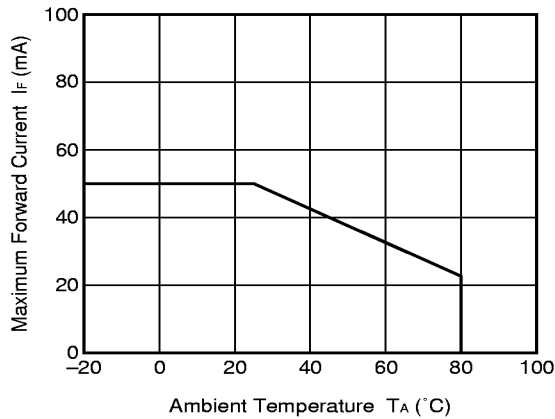
★ *1 Test Circuit for Switching Time



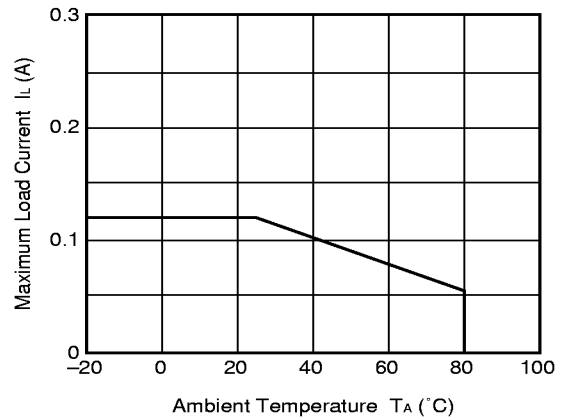
*2 PS7241C-AT1 only

★ OCMOS TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

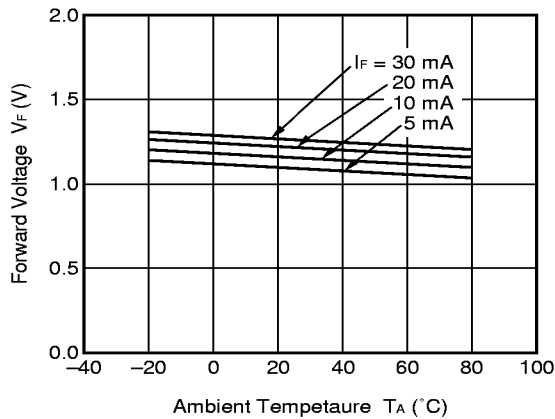
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



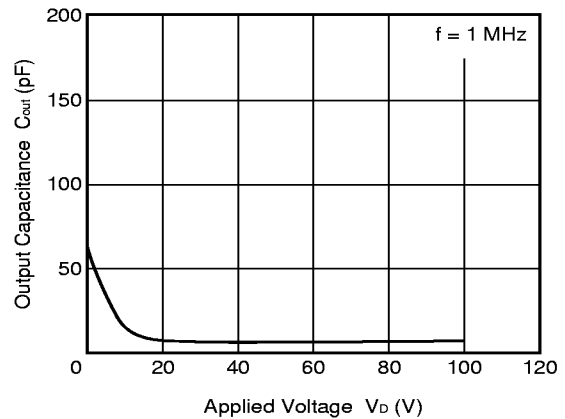
MAXIMUM LOAD CURRENT vs. AMBIENT TEMPERATURE



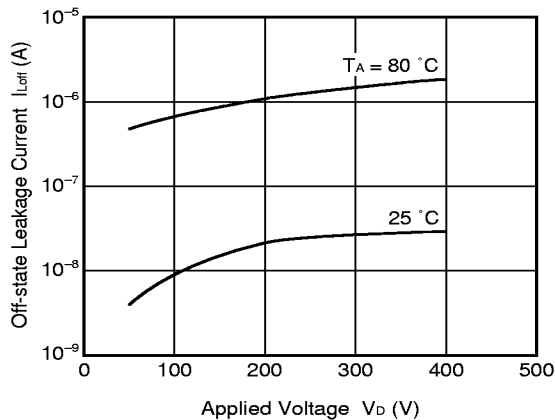
FORWARD VOLTAGE vs. AMBIENT TEMPERATURE



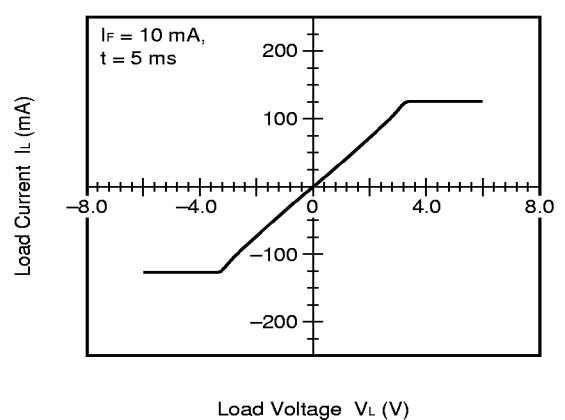
OUTPUT CAPACITANCE vs. APPLIED VOLTAGE



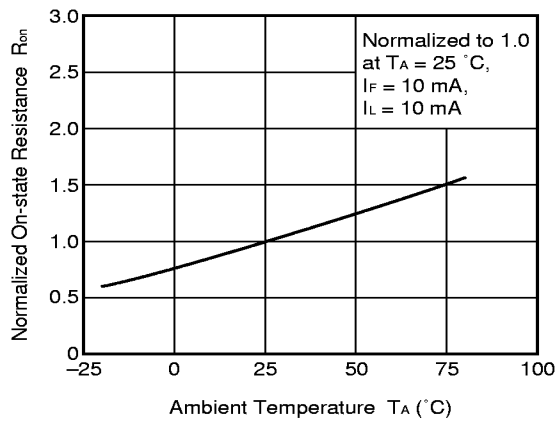
OFF-STATE LEAKAGE CURRENT vs. APPLIED VOLTAGE



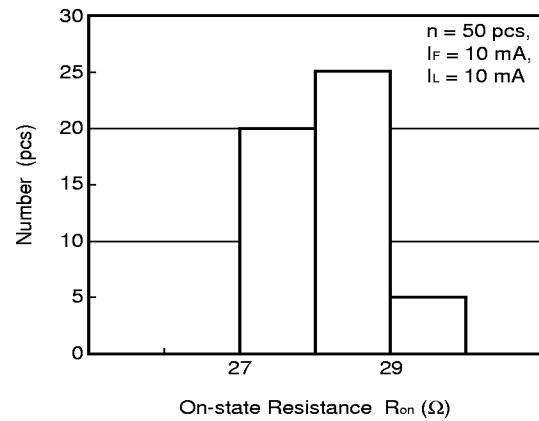
LOAD CURRENT vs. LOAD VOLTAGE



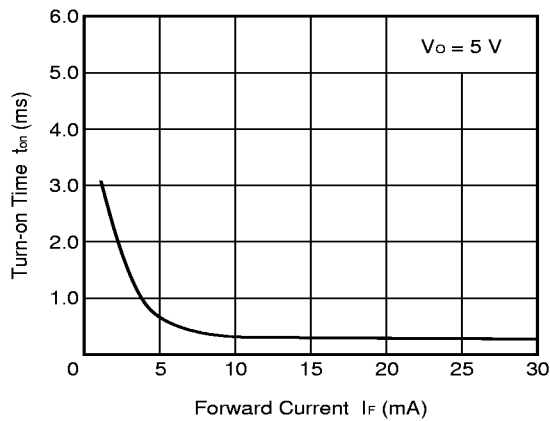
NORMALIZED ON-STATE RESISTANCE vs. AMBIENT TEMPERATURE



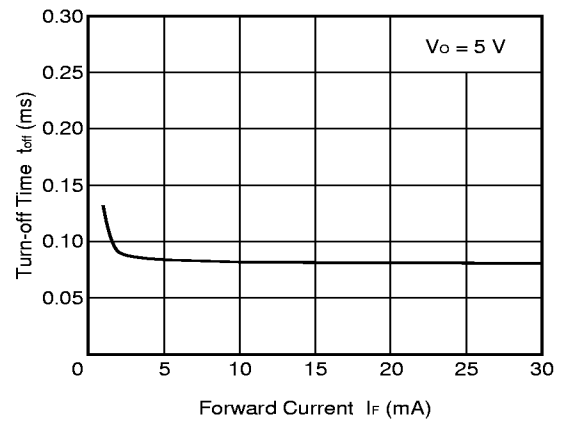
ON-STATE RESISTANCE DISTRIBUTION



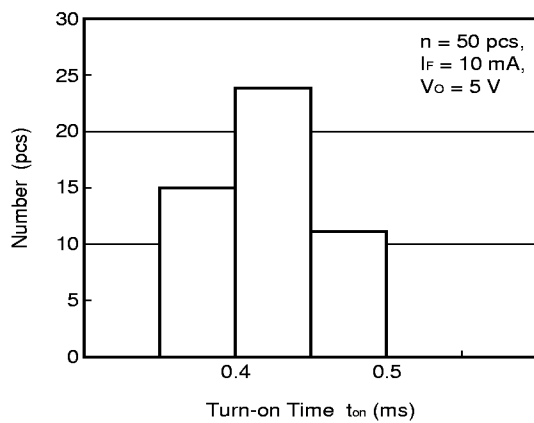
TURN-ON TIME vs. FORWARD CURRENT



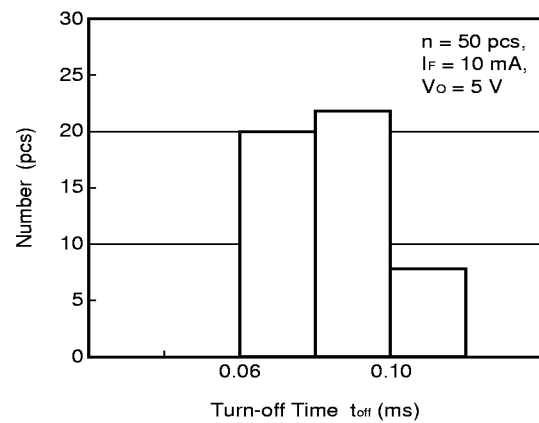
TURN-OFF TIME vs. FORWARD CURRENT



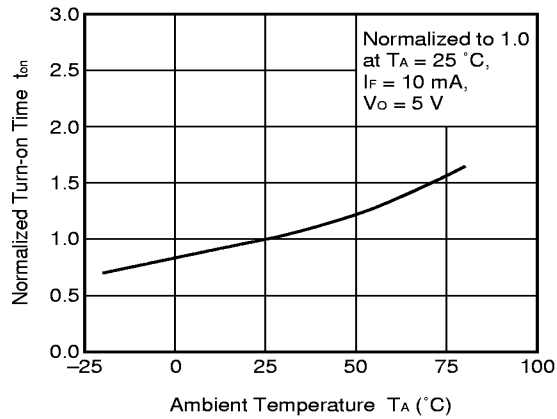
TURN-ON TIME DISTRIBUTION



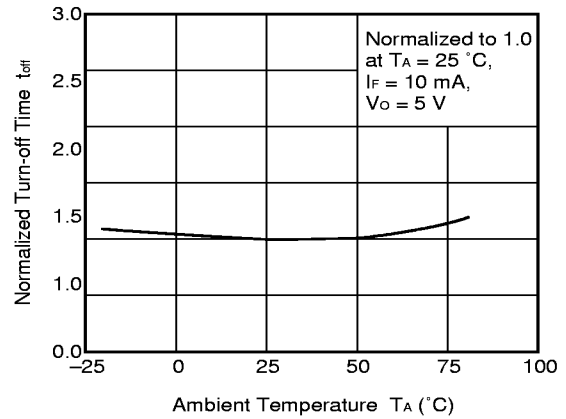
TURN-OFF TIME DISTRIBUTION



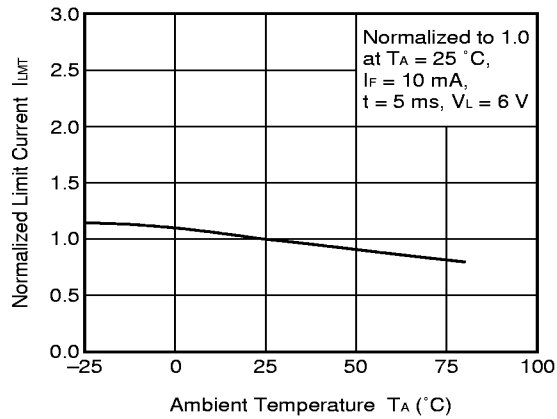
NORMALIZED TURN-ON TIME vs.
AMBIENT TEMPERATURE



NORMALIZED TURN-OFF TIME vs.
AMBIENT TEMPERATURE



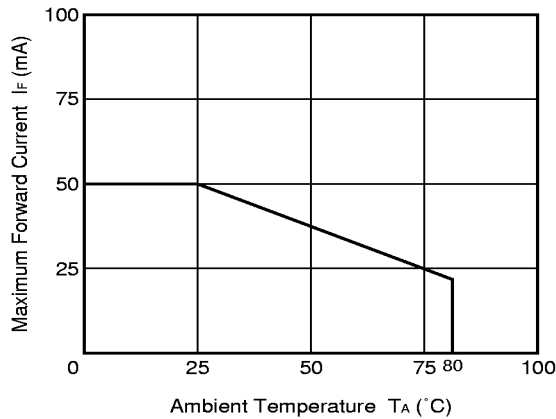
NORMALIZED LIMIT CURRENT vs.
AMBIENT TEMPERATURE



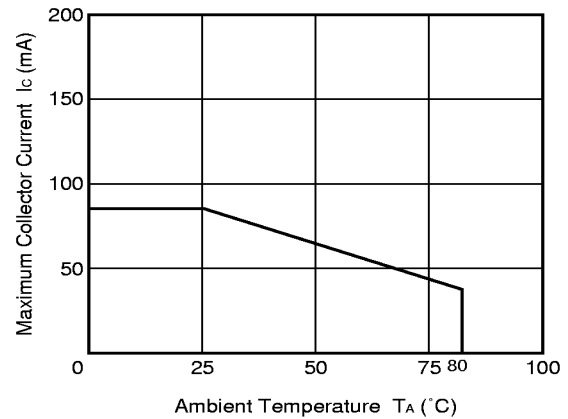
Remark The graphs indicate nominal characteristics.

★ PHOTOCOUPLER TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

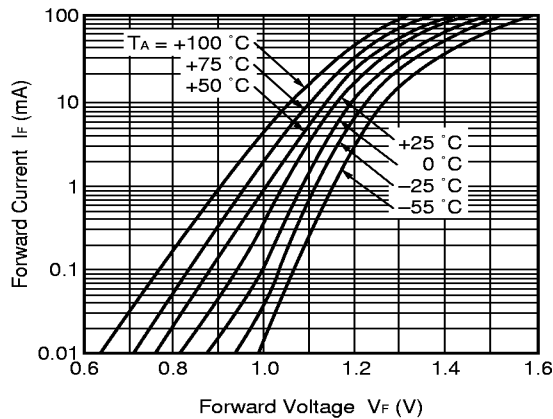
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



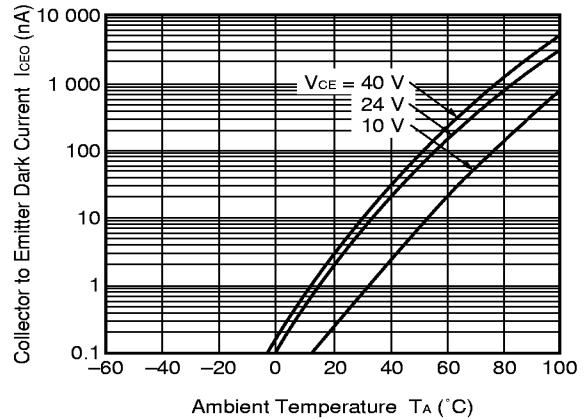
MUXIMUM COLLECTOR CURRENT vs. AMBIENT TEMPERATURE



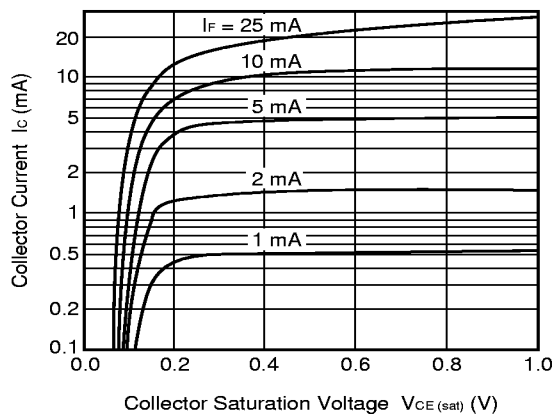
FORWARD CURRENT vs. FORWARD VOLTAGE



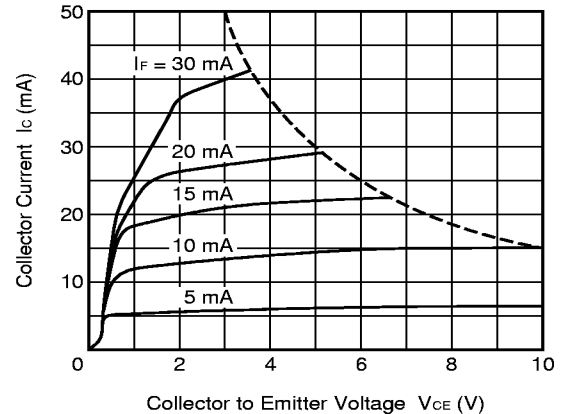
COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE



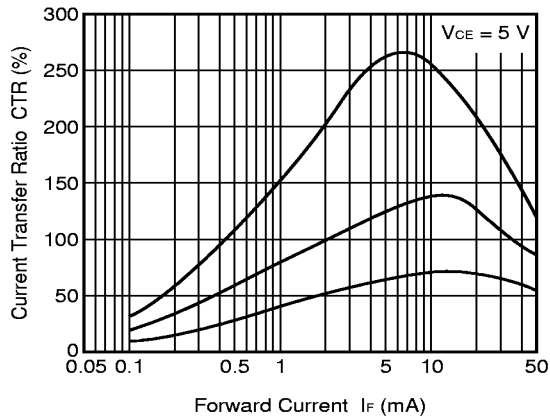
COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE



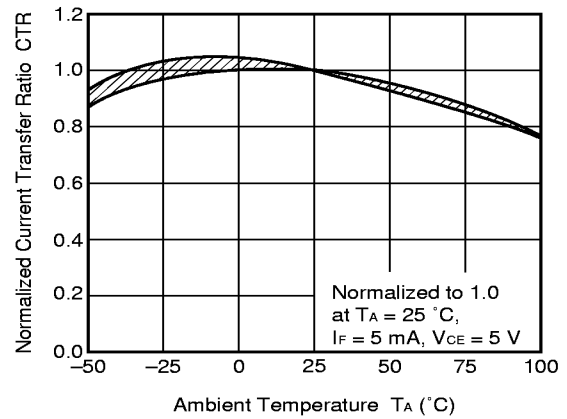
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



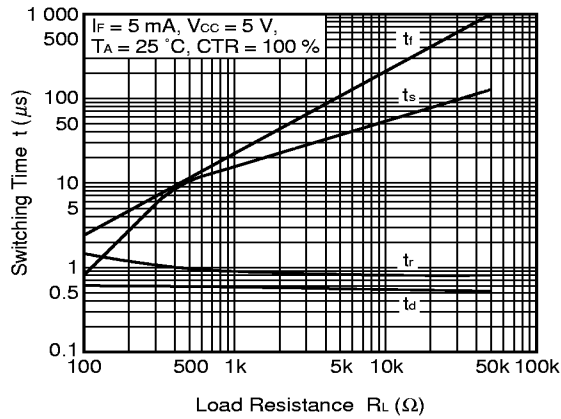
CURRENT TRANSFER RATIO vs.
FORWARD CURRENT



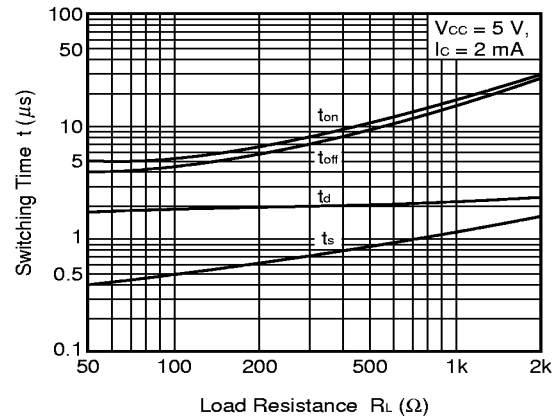
NORMALIZED CURRENT TRANSFER
RATIO vs. AMBIENT TEMPERATURE



SWITCHING TIME vs.
LOAD RESISTANCE



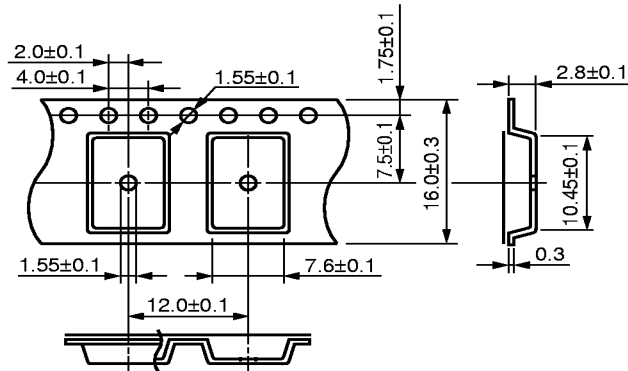
SWITCHING TIME vs.
LOAD RESISTANCE



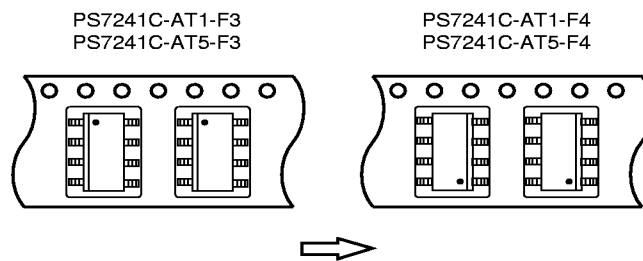
Remark The graphs indicate nominal characteristics.

★ TAPING SPECIFICATIONS (in millimeters)

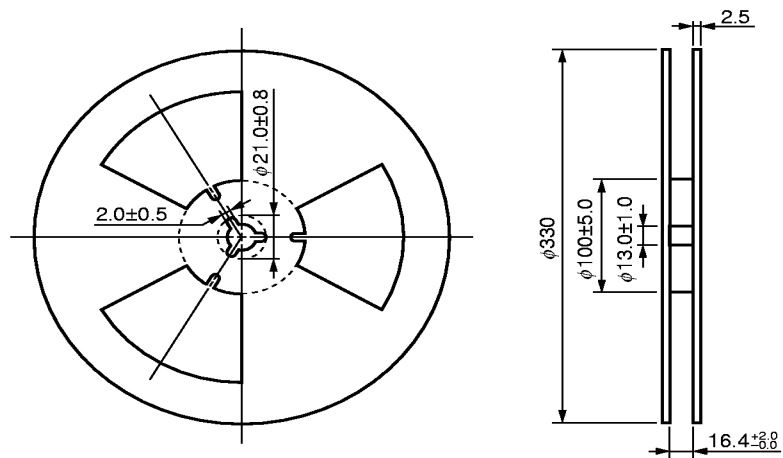
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



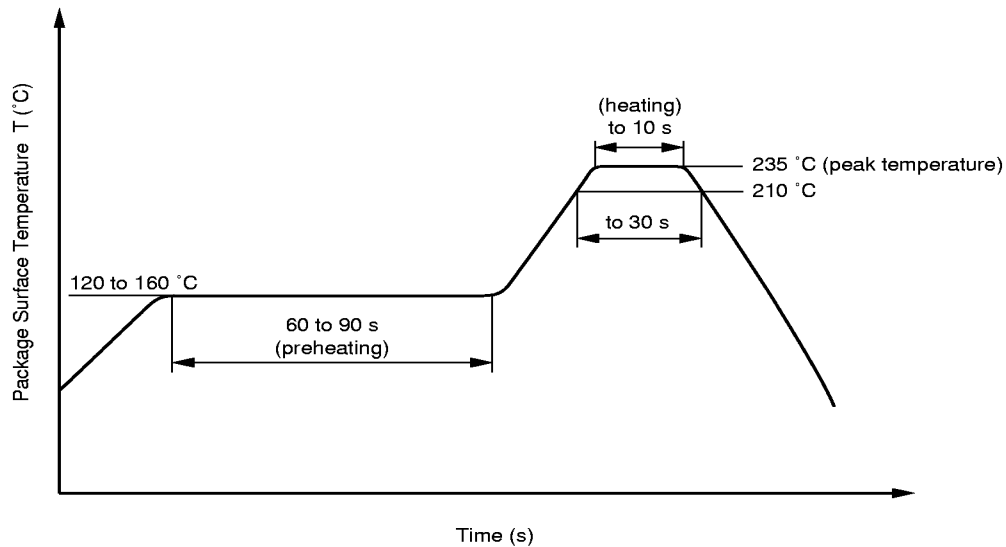
Packing: 1 500pcs/reel

★ RECOMMENDED SOLDERING CONDITIONS

(1) Infrared reflow soldering

- Peak reflow temperature 235 °C (package surface temperature)
- Time of temperature higher than 210 °C 30 seconds or less
- Number of reflows Two
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended.)

Recommended Temperature Profile of Infrared Reflow

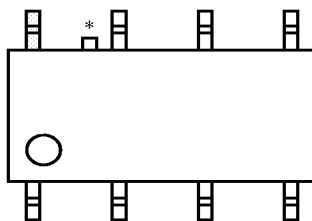


(2) Dip soldering

- Temperature 260 °C or below (molten solder temperature)
- Time 10 seconds or less
- Number of times One
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended.)

(3) Cautions

- Fluxes
 - Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.
- Avoid shorting between portion of frame and leads.



* : Portion of frame