

PS7841-A11, PS7841-A15**FOR OPTICAL DAA
16-PIN SSOP Optical Coupled MOS FET****DESCRIPTION**

The PS7841-A11 and PS7841-A15 are solid state relays for optical DAA (Data Access Arrangement). They have an OCMOS FET, photocoupler, diode bridge and darlington transistor.

This device is suitable for analog signal control applications such as laptop PCs, modem cards, voice telephony and fax machines.

FEATURES

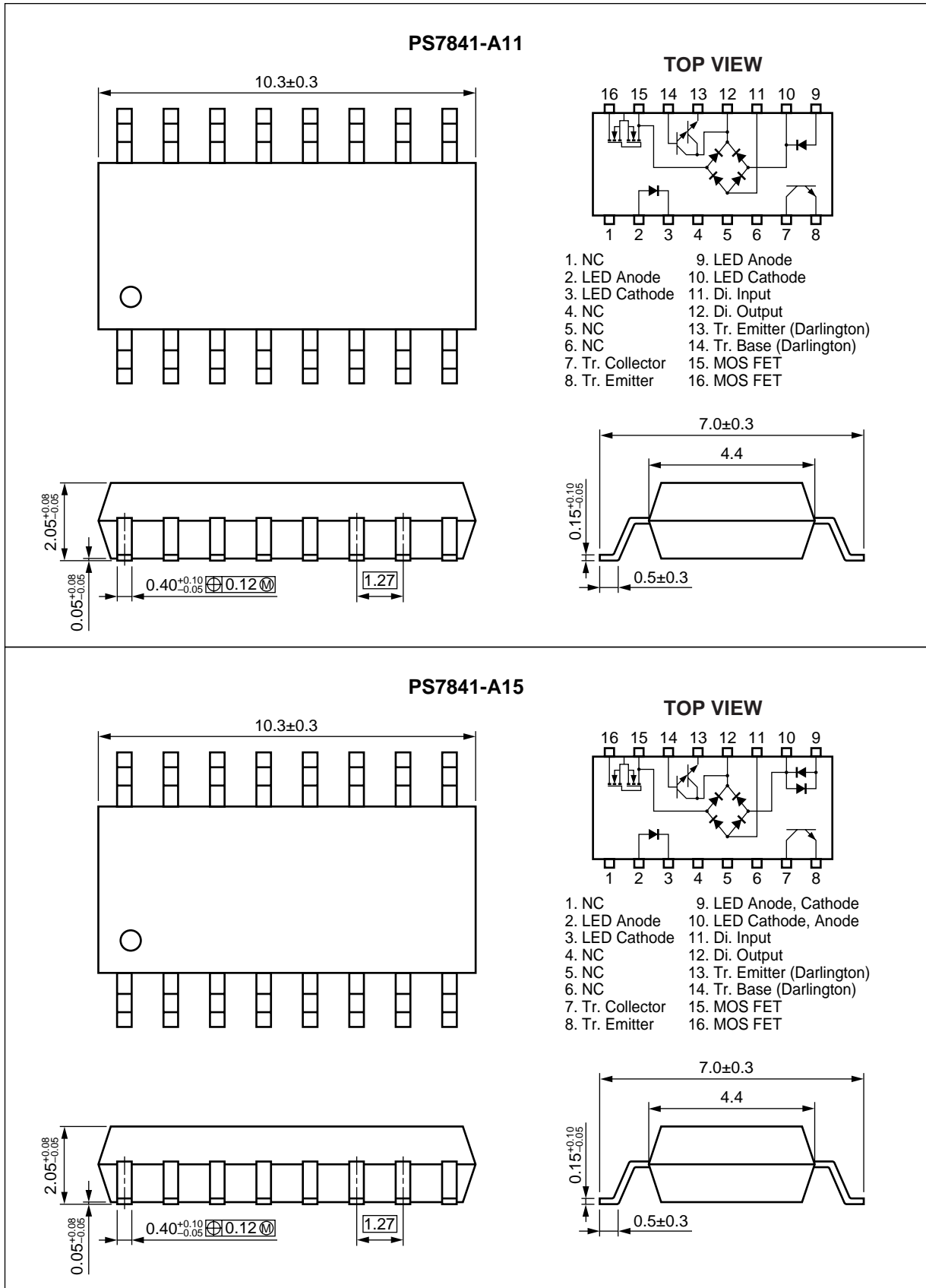
- For optical DAA circuit
 - OCMOS FET
 - Photocoupler DC input response : PS7841-A11
AC input response : PS7841-A15
 - Diode bridge
 - Darlington transistor
- Low LED Operating Current ($I_f = 2 \text{ mA}$)
- ★ • Small and thin package (16-pin SSOP: 5.72 mm (225), Pin pitch = 1.27 mm, Height = 2.1 mm)
- Ordering number of taping product: PS7841-A11-F3, F4, PS7841-A15-F3, F4
- UL approved: File No. E72422 (S)

APPLICATIONS

- Laptop PC, PDA
- Modem card
- Telephone, FAX

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.
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 °C, unless otherwise specified)

Parameter		Symbol	Ratings	Unit	
OCMOS FET (Pin No. 2, 3, 15, 16)	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}	250	mA
		Power Dissipation	P _D	430	mW
Photocoupler (Pin No. 7, 8, 9, 10)	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
		Collector Current	I _C	80	mA
		Power Dissipation	P _C	50	mW
Diode Bridge (Pin No. 10, 11, 12, 15)	Forward Current	I _F	140	mA	
	Reverse Voltage	V _R	100	V	
Darlington Transistor (Pin No. 12, 13, 14)	Collector to Emitter Voltage	V _{CEO}	40	V	
	Collector Current	I _C	120	mA	
	Power Dissipation	P _C	500	mW	
Isolation Voltage ^{*4}		BV	1 500	Vr.m.s.	
Total Power Dissipation		P _T	650	mW	
Operating Ambient Temperature		T _A	-40 to +80	°C	
Storage Temperature		T _{stg}	-40 to +100	°C	

*1 PW = 100 μs, Duty Cycle = 1 %

*2 PW = 100 ms, 1 shot

*3 PS7841-A11 only

*4 AC voltage for 1 minute at T_A = 25 °C, RH = 60 % between input and output

RECOMMENDED OPERATING CONDITIONS (T_A = 25 °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)

OCMOS FET (Pin No. 2, 3, 15, 16)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V _F	I _F = 10 mA		1.2	1.4	V
MOS FET	Off-state Leakage Current	I _{Loff}	V _D = 400 V			1.0	μA
★ 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		20	30	Ω
		R _{on2}	I _F = 10 mA, I _L = 120 mA, t ≤ 10 ms		16	25	
	Turn-on Time	t _{on}	I _F = 10 mA, V _O = 5 V, PW ≥ 10 ms		0.3	1.0	ms
	Turn-off Time	t _{off}			0.04	0.2	
	Isolation Resistance	R _{I-O}	V _{I-O} = 500 V _{DC}	10 ⁹			Ω
	Isolation Capacitance	C _{I-O}	V = 0 V, f = 1 MHz		1.1		pF

PHOTOCOUPLER (Pin No. 7, 8, 9, 10)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V _F	I _F = 10 mA		1.2	1.4	V
Transistor	Collector to Emitter Dark Current	I _{CEO}	V _{CE} = 40 V, I _F = 0 mA			0.1	μA
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		0.1	0.3	V
	Rise Time	t _r	V _{CC} = 5 V, I _C = 2 mA, R _L = 100 Ω		3.0		μs
	Fall Time	t _f			5.0		
	Isolation Resistance	R _{I-O}	V _{I-O} = 500 V _{DC}	10 ¹¹			Ω
	Isolation Capacitance	C _{I-O}	V = 0 V, f = 1 MHz		0.4		pF

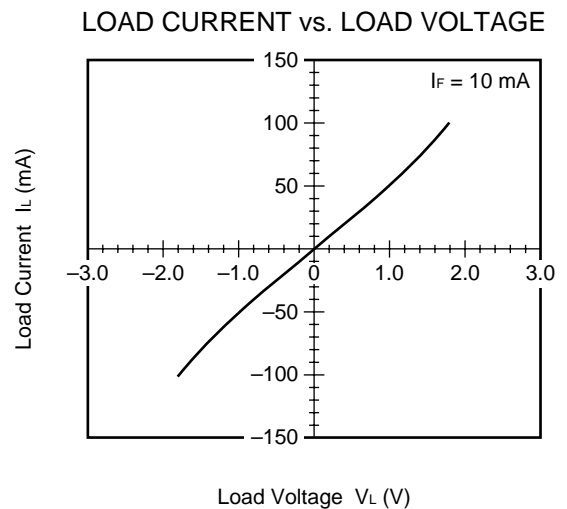
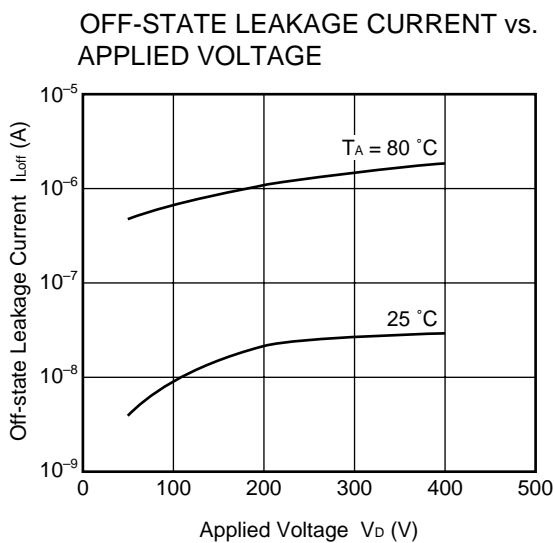
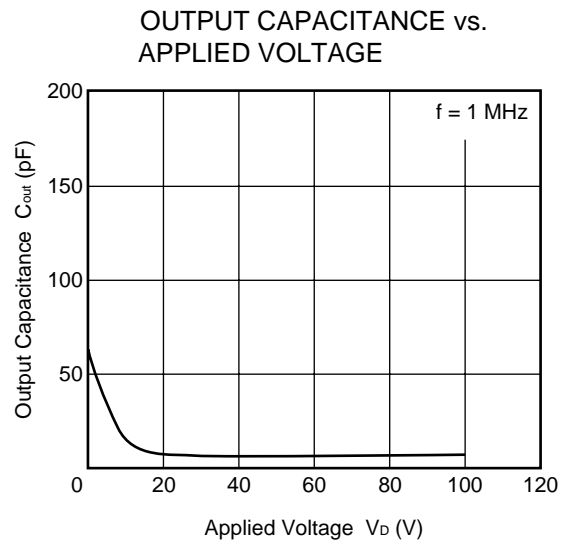
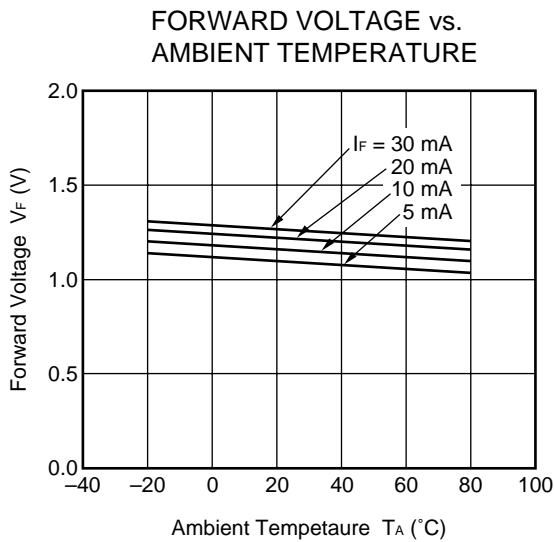
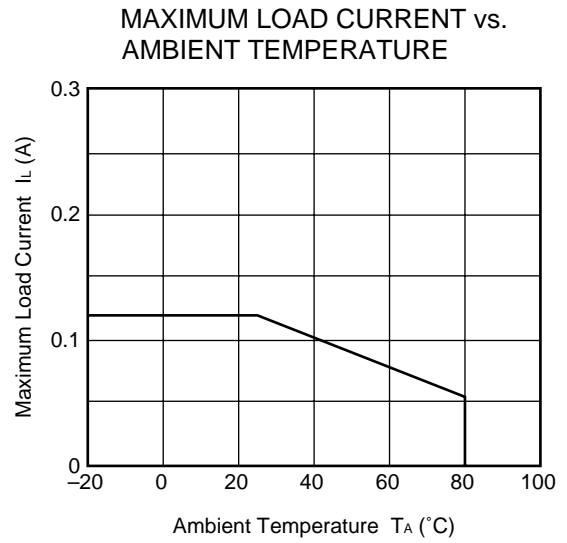
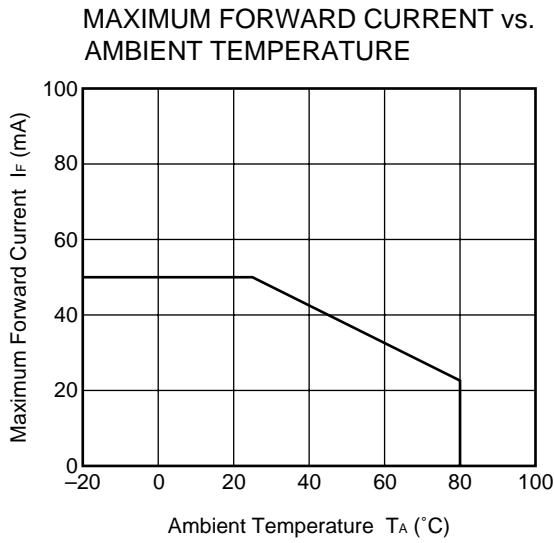
DIODE BRIDGE (Pin No. 10, 11, 12, 15)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Forward Voltage	V _F	I _F = 120 mA		0.9	1.2	V
Reverse Current	I _R	V _R = 100 V			10	μA

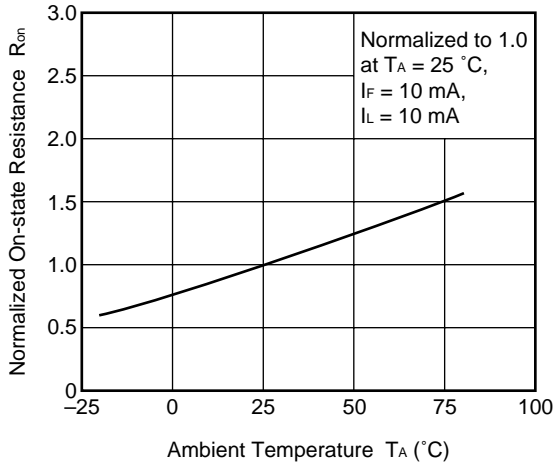
DARLINGTON TRANSISTOR (Pin No. 12, 13, 14)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector Saturation Voltage	V _{CE(sat)}	I _C = 120 mA, I _B = 100 μA		1.0	1.4	V
Collector to Emitter Dark Current	I _{CEX}	I _B = 0 mA, V _{CE} = 30 V		0.01	1.0	μA
DC Current Gain	h _{FE}	I _C = 120 mA, V _{CE} = 10 V	10 000	35 000		

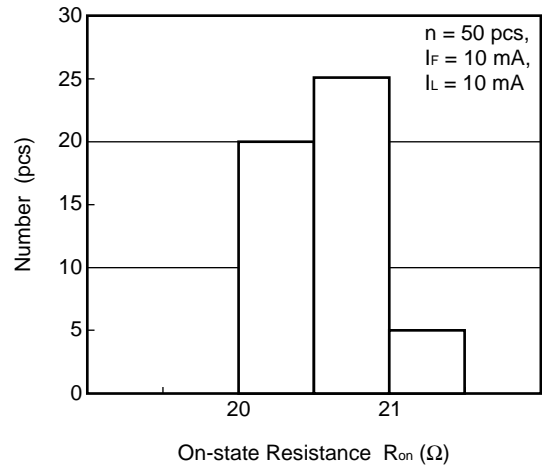
OCMOS TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified)



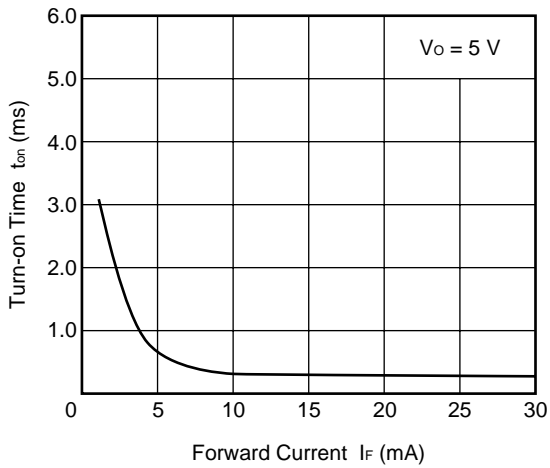
NORMALIZED ON-STATE RESISTANCE vs. AMBIENT TEMPERATURE



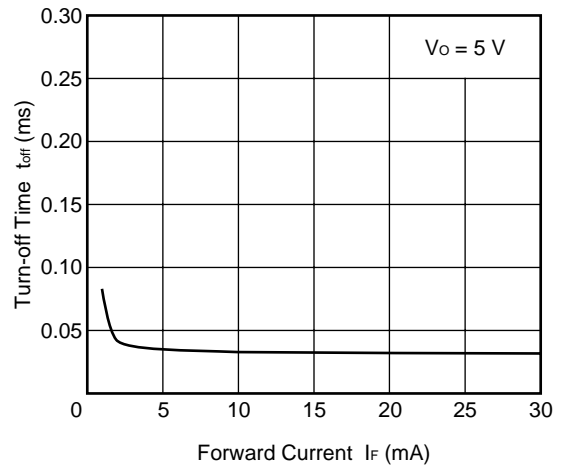
ON-STATE RESISTANCE DISTRIBUTION



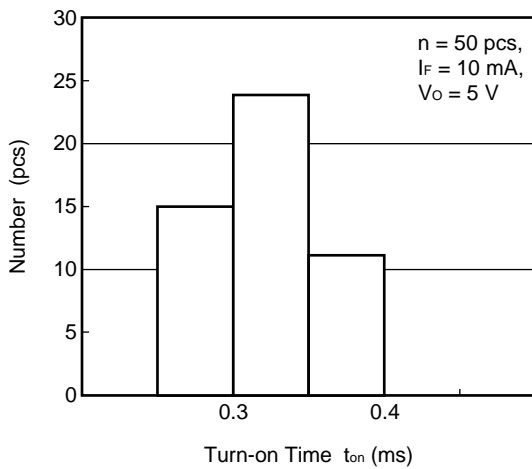
TURN-ON TIME vs. FORWARD CURRENT



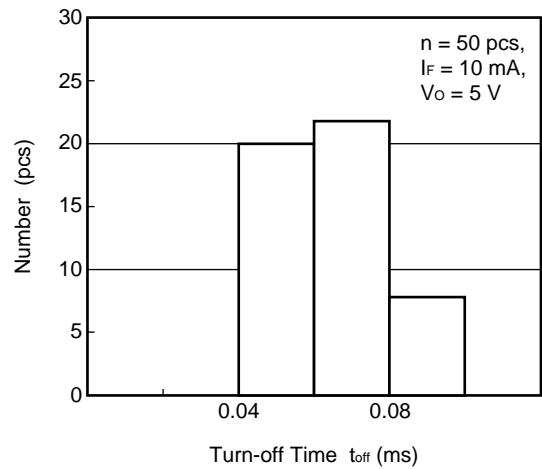
TURN-OFF TIME vs. FORWARD CURRENT



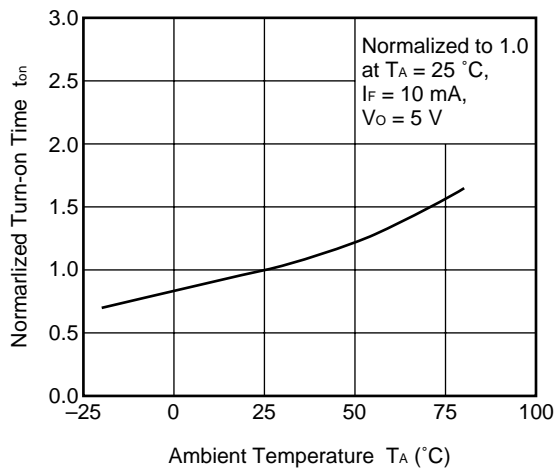
TURN-ON TIME DISTRIBUTION



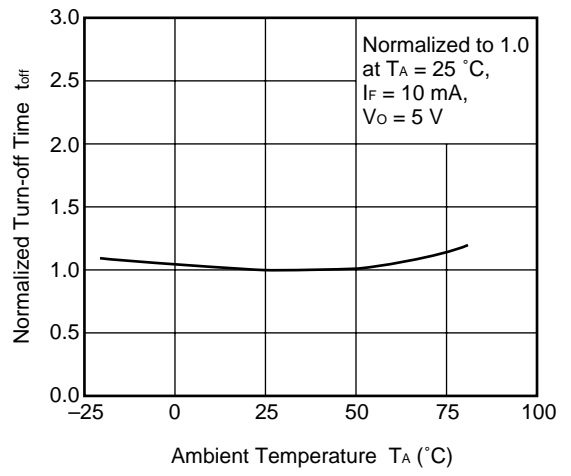
TURN-OFF TIME DISTRIBUTION



NORMALIZED TURN-ON TIME vs. AMBIENT TEMPERATURE



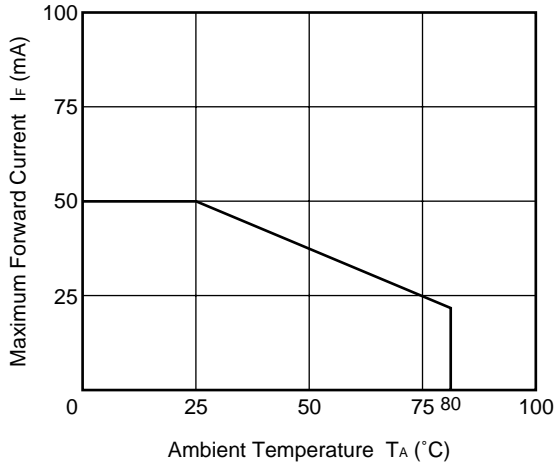
NORMALIZED TURN-OFF TIME vs. AMBIENT TEMPERATURE



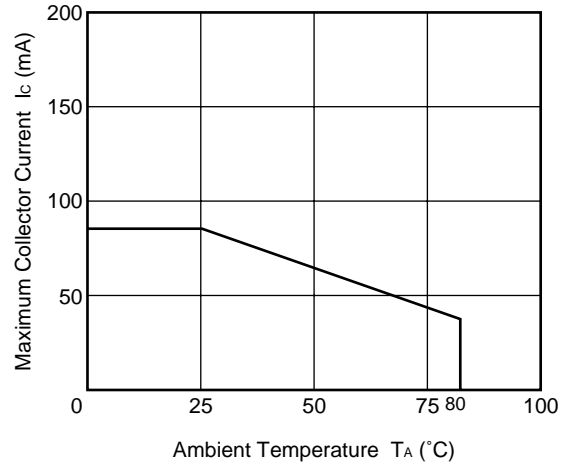
Remark The graphs indicate nominal characteristics.

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

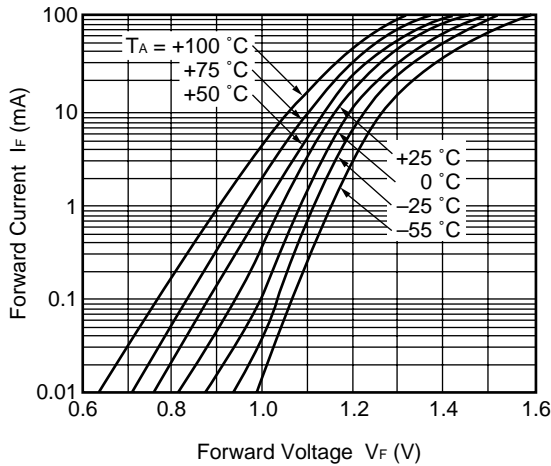
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



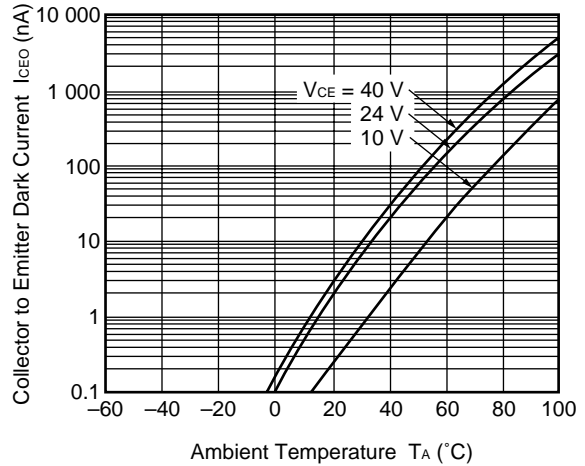
MUXIMUM COLLECTOR CURRENT vs. AMBIENT TEMPERATURE



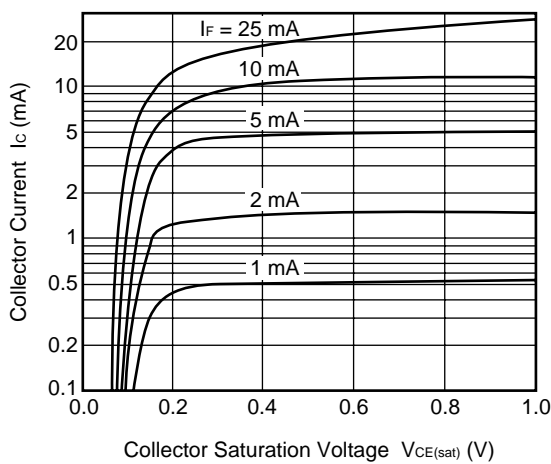
FORWARD CURRENT vs. FORWARD VOLTAGE



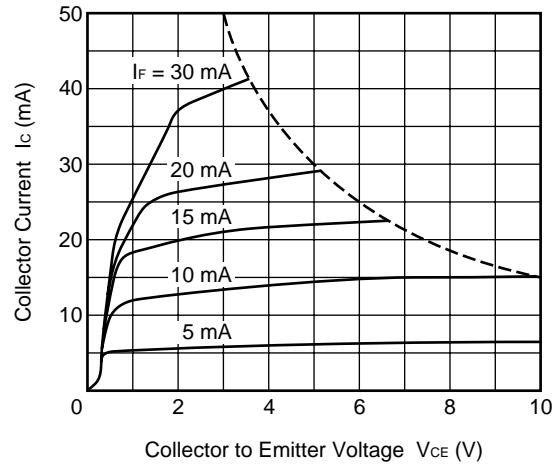
COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE



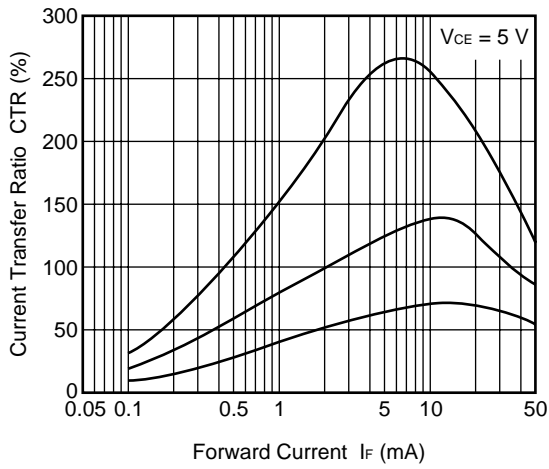
COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE



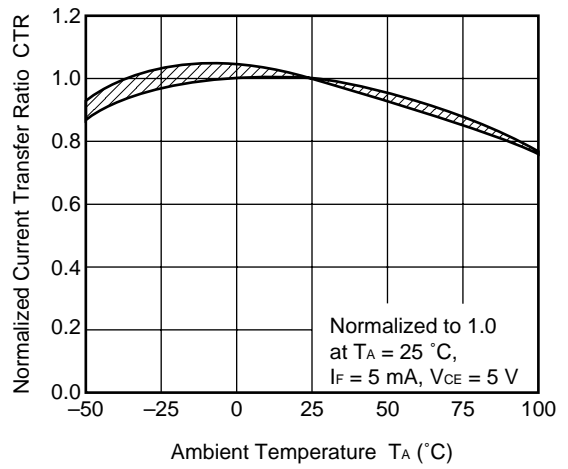
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



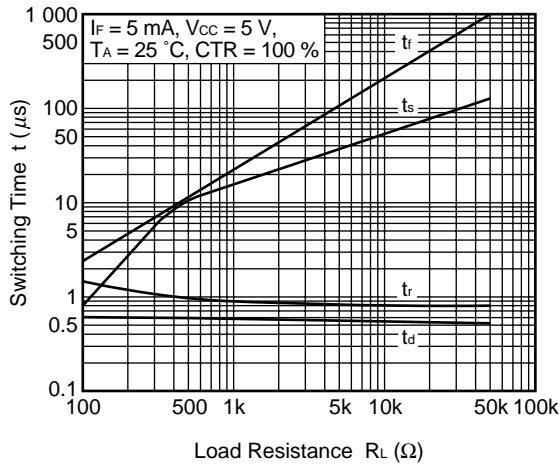
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



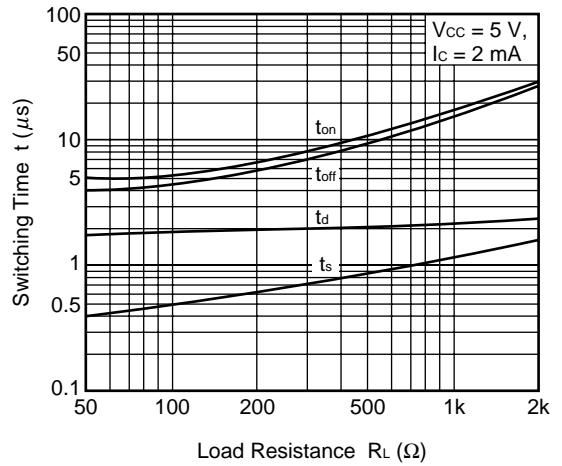
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



SWITCHING TIME vs. LOAD RESISTANCE



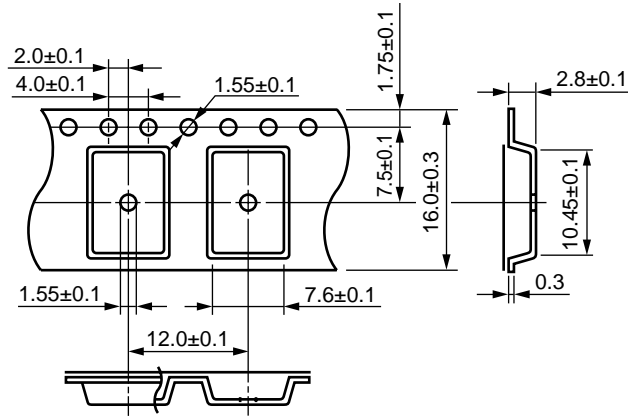
SWITCHING TIME vs. LOAD RESISTANCE



Remark The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (in millimeters)

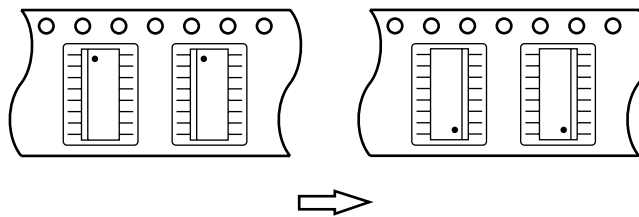
Outline and Dimensions (Tape)



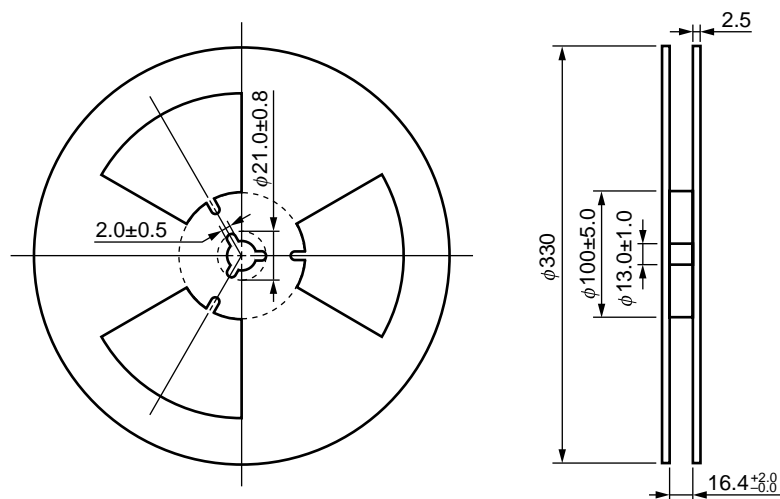
Tape Direction

PS7841-A11-F3
PS7841-A15-F3

PS7841-A11-F4
PS7841-A15-F4



Outline and Dimensions (Reel)



Packing: 1 500pcs/reel

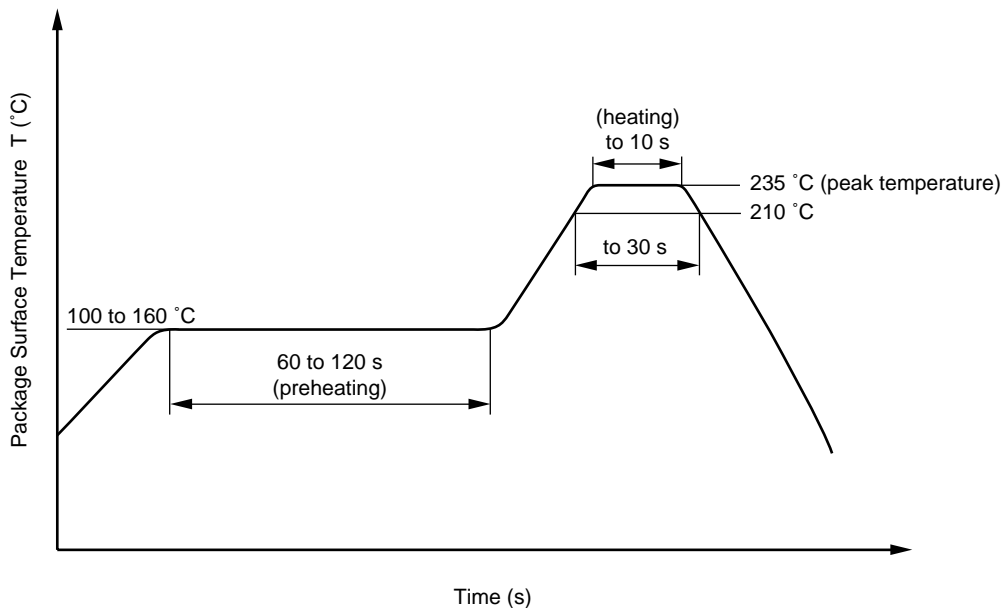
RECOMMENDED SOLDERING CONDITIONS

(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 One
- 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

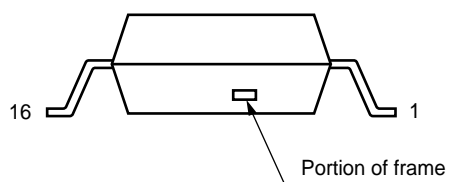
- Temperature 260 °C or below (molten solder temperature)
- Time 10 seconds or less
- Number of times One
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended.)

(3) Cautions

- Fluxes
Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.

★

- Portion of frame
This device should be used without wiring the underside.



CAUTION

Within this device there exists GaAs (Gallium Arsenide) material which is a harmful substance if ingested. Please do not under any circumstances break the hermetic seal.

- **The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.**
 - No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Corporation. NEC Corporation assumes no responsibility for any errors which may appear in this document.
 - NEC Corporation does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from use of a device described herein or any other liability arising from use of such device. No license, either express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC Corporation or others.
 - Descriptions of circuits, software, and other related information in this document are provided for illustrative purposes in semiconductor product operation and application examples. The incorporation of these circuits, software, and information in the design of the customer's equipment shall be done under the full responsibility of the customer. NEC Corporation assumes no responsibility for any losses incurred by the customer or third parties arising from the use of these circuits, software, and information.
 - While NEC Corporation has been making continuous effort to enhance the reliability of its semiconductor devices, the possibility of defects cannot be eliminated entirely. To minimize risks of damage or injury to persons or property arising from a defect in an NEC semiconductor device, customers must incorporate sufficient safety measures in its design, such as redundancy, fire-containment, and anti-failure features.
 - NEC devices are classified into the following three quality grades:
"Standard", "Special", and "Specific". The Specific quality grade applies only to devices developed based on a customer designated "quality assurance program" for a specific application. The recommended applications of a device depend on its quality grade, as indicated below. Customers must check the quality grade of each device before using it in a particular application.
 - Standard: Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots
 - Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)
 - Specific: Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.
- The quality grade of NEC devices is "Standard" unless otherwise specified in NEC's Data Sheets or Data Books. If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact an NEC sales representative in advance.