

23RS-pA SERIES

LOW LEAKAGE CURRENT ▲ Si MOSFET RELAY



SILICON Si MOSFET RELAY ▲ SMD type
Low leakage current ▲ Switches AC or DC load
 One channel and two channel packages available
 Input TTL / CMOS compatible
 Moisture Sensitivity Level ▲ MSL 1
UL 1577 approved ▲ File no E344988

SPECIFICATION

Item	Characteristics	
Contact Form	1 Form A / 2 Form A ▲ Normally open switch	
Load Voltage	V_L	250V
Operation LED Current	$I_{F ON}$	3mA
Load Current	I_L	170mA
On-Resistance	R_{ON}	11Ω
Output Capacitance	C_{OUT}	37pF
Low Off-State Leakage Current	I_{LEAK}	1nA at 250V _{DC}

APPLICATIONS

Automatic Test Equipment	I/O Modules	Industrial Automation	Measurement Equipment	Security Equipment	Sensing Equipment	Telecom Equipment

DIMENSIONS

Package	Illustration	Dimensions	PCB Board Pattern
SOP-4			
SOP-8			

ABSOLUTE MAXIMUM RATINGS ▲ AMBIENT TEMPERATURE $T_A = 25^\circ\text{C}$

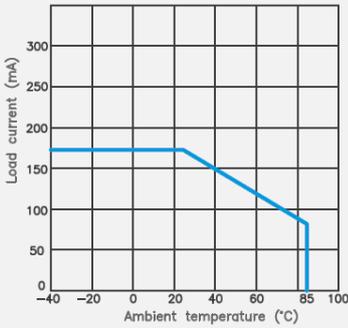
Item	Condition	Symbol	Value		Unit	
Type	Outline package		SOP-4	SOP-8		
	Part number		AB23RS-pA	AC23RS-pA		
	Output channels		1	2	Channels	
Input	Continuous LED Current		I_F	50	mA	
	Peak LED Current	100 Hz, Duty 1%	I_{FP}	500	mA	
	LED Reverse Voltage		V_R	5	V	
	Input Power Dissipation		P_{IN}	75	mW	
Output	Load Voltage		V_L	250 (AC peak or DC)		V
	Load Current		I_L	170	140	mA
	Peak Load Current	1 ms, 1 shot	I_{PEAK}	420		mA
	Output Power Dissipation		P_{OUT}	300	450	mW
Relay	Total Power Dissipation		P_T	350	500	mW
	I/O Breakdown Voltage		$V_{I/O}$	1500		V_{RMS}
	Operating Temperature Range		T_{OPR}	-40 to +85		$^\circ\text{C}$
	Storage Temperature Range		T_{STG}	-40 to +100		$^\circ\text{C}$

ELECTRICAL CHARACTERISTICS ▲ AMBIENT TEMPERATURE $T_A = 25^\circ\text{C}$

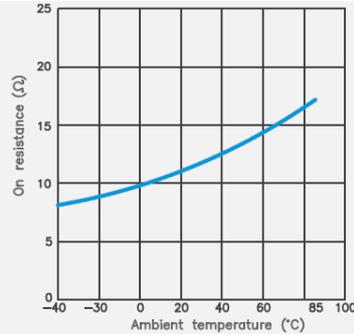
Item	Condition	Symbol	Min.	Typ.	Max.	Unit	
Input	LED Forward Voltage	$I_F = 10\text{mA}$	V_F	1	1.17	1.5	V
	Operation LED Current		I_{FON}		0.6	3	mA
	Recovery LED Voltage		V_{FOFF}	0.5	1		V
Output	On-Resistance Drain to Drain (tested within 1 sec.)	$I_F=5\text{mA}, I_L=\text{Rating}$	R_{ON}		11	15	Ω
	Off-State Leakage Current	$V_L = 250\text{V}$	I_{LEAK}		0.2	1	nA
	Output Capacitance	$V_L=0\text{V}, f=1\text{MHz}$	C_{OUT}		37		pF
Trans- mission	Turn-On Time	$I_F=5\text{mA}, I_L=\text{Rating}$	t_{ON}		0.15	0.3	ms
	Turn-Off Time	$I_F=5\text{mA}, I_L=\text{Rating}$	t_{OFF}		0.05	0.2	ms
Coupled	I/O Insulation Resistance		$R_{I/O}$	10^9		Ω	
	I/O Capacitance	$f=1\text{MHz}$	$C_{I/O}$		0.8	pF	

REFERENCE DATA

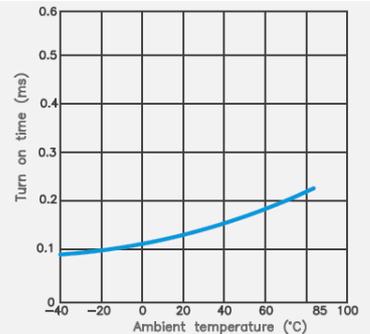
Load current vs. ambient temp.



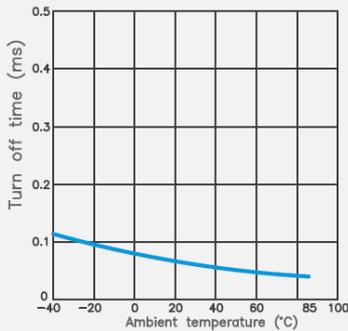
On resistance vs. ambient temp.



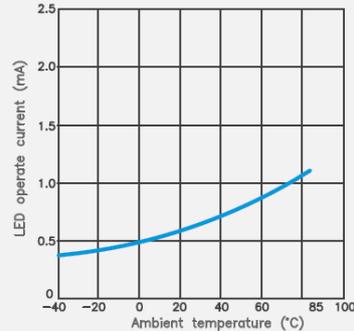
Turn on time vs. ambient temp.



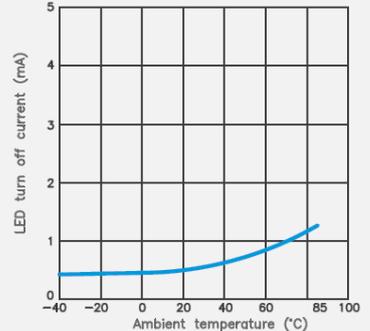
Turn off time vs. ambient temp.



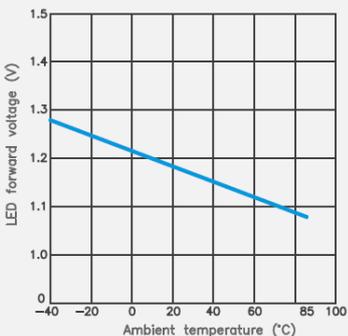
LED operate current vs. ambient temp



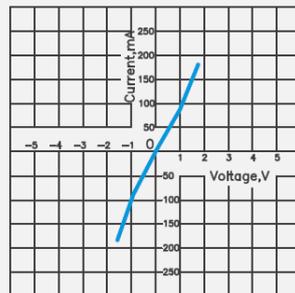
LED turn off current vs. ambient temp.



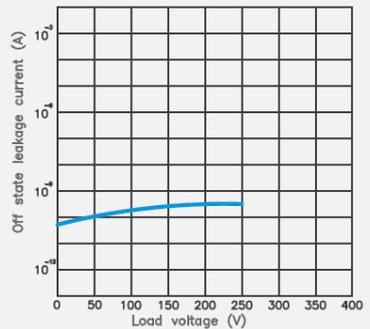
LED forward voltage vs. ambient temp.



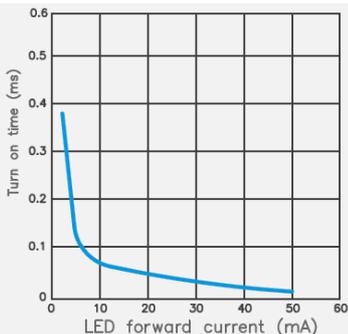
Current vs. voltage characteristics of output at MOS portion



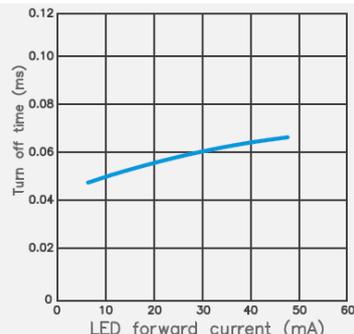
Off state leakage current vs. load voltage



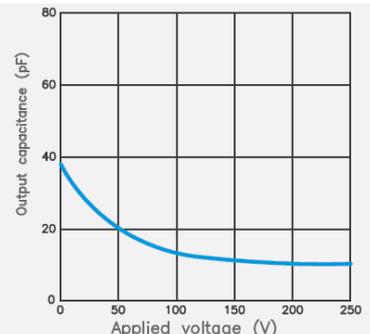
Turn on time vs. LED forward current



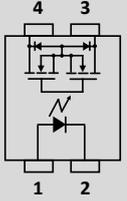
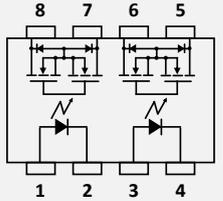
Turn off time vs. LED forward current



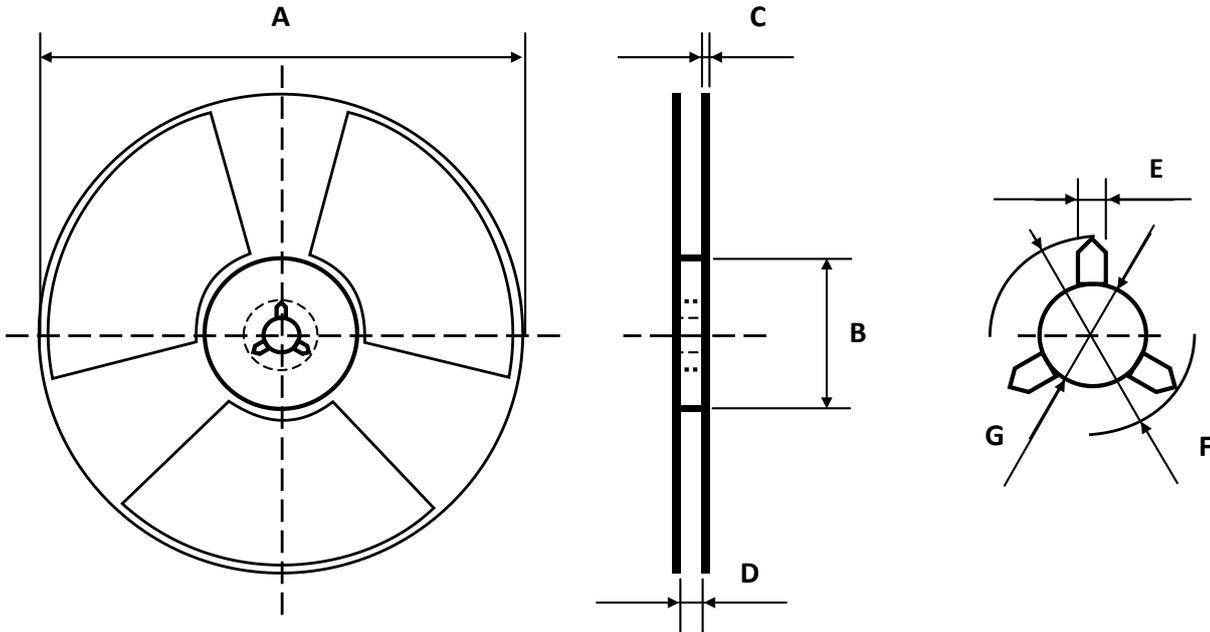
Output capacitance vs. applied voltage



PIN DESCRIPTION AND PART NUMBER

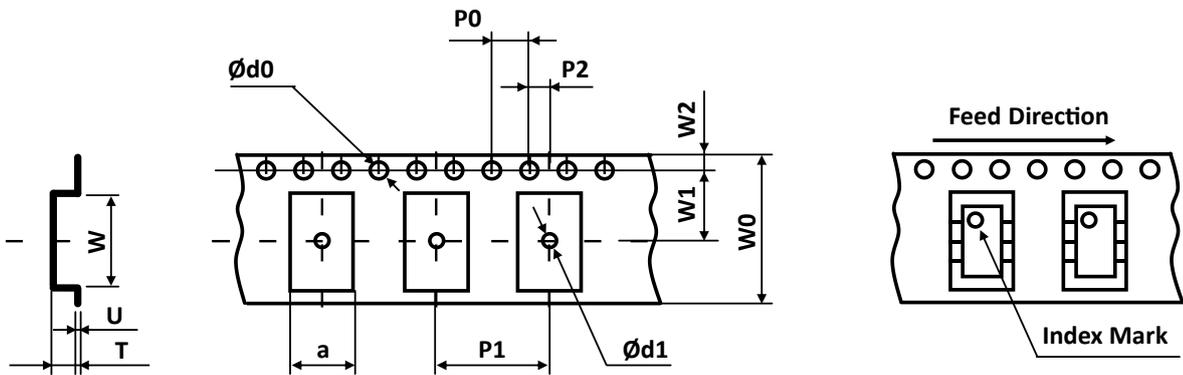
Circuit Diagram	Pin Description	Part No.	Package	Packing
	1 Anode (+) ▪ LED 2 Cathode (-) ▪ LED 3,4 Drain ▪ MOSFET	AB23RS-pA AB23RS-pA-R1	SOP-4 SOP-4	Tube (100pcs) Reel (1 000pcs)
	1,3 Anode (+) ▪ LED 2,4 Cathode (-) ▪ LED 5,6,7,8 Drain ▪ MOSFET	AC23RS-pA AC23RS-pA-R1	SOP-8 SOP-8	Tube (50pcs) Reel (1 000pcs)

REEL DIMENSIONS ▲ All dimensions in mm



Size	A	B	C	D	E	F	G
SOP-4	330	100	2	13	2	13	21
SOP-8	330	100	2	17	2	13	21

TAPE DIMENSIONS ▲ All dimensions in mm



Size	W	U	T	a	Ød0	Ød1	P0	P1	P2	W0	W1	W2
SOP-4	4.6	0.3	2.3	7.2	1.5	1.5	4	12	2	12	7.5	1.75
SOP-8	10.4	0.3	2.3	7.5	1.5	1.5	4	12	2	16	7.5	1.75

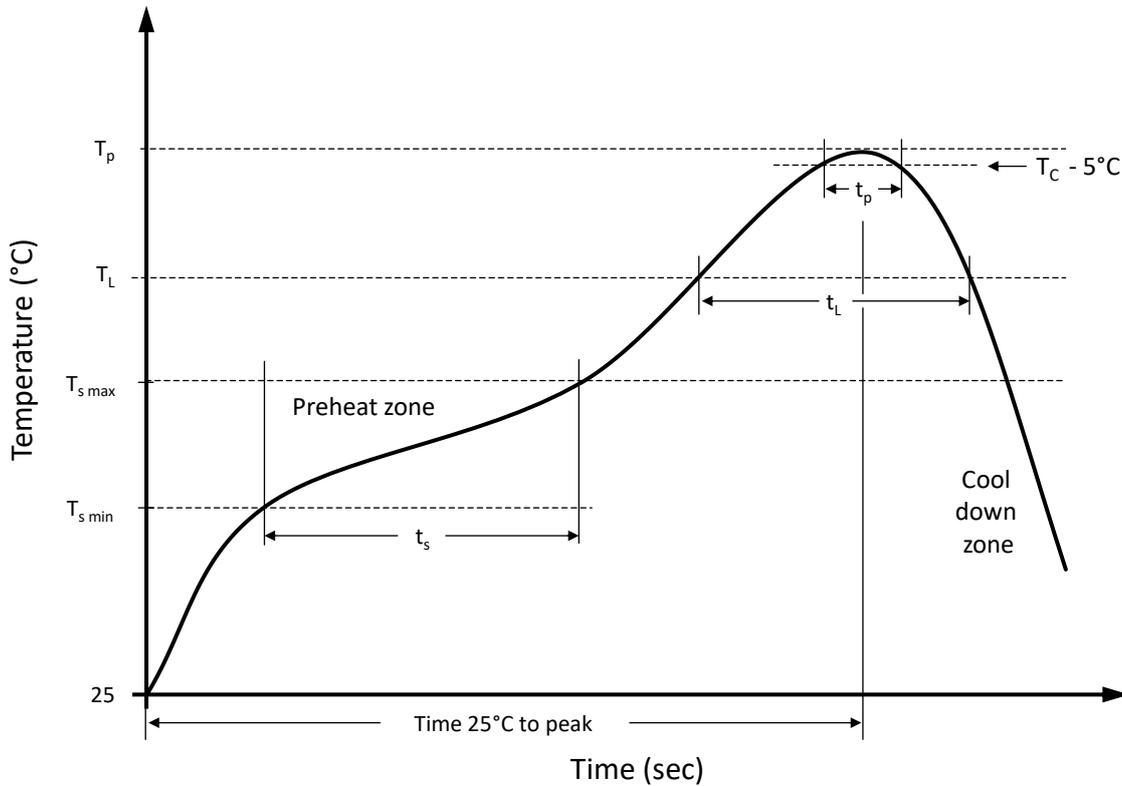
PACKING QUANTITIES

Tape and Reel Packing	PCS/Reel
SOP-4	1 000
SOP-8	1 000

Tube Packing	PCS/Tube	Tubes/Box	Units/Box
SOP-4	100	30	3 000
SOP-8	50	30	1 500

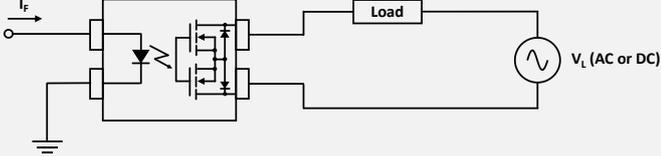
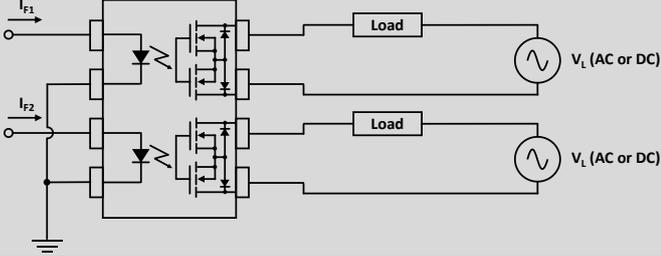
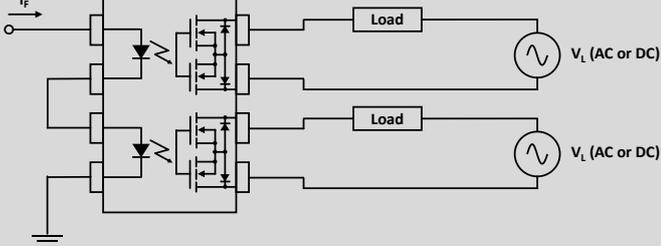
STORAGE AND HANDLING CONDITIONS

ESD level	Floor life	Conditions	MSL
HBM class 2	Unlimited	$T_A < 30^\circ\text{C}$, RH < 85%	1

RECOMMENDED REFLOW SOLDERING PROFILE ▲ SMD PACKAGE

Recommended reflow soldering conditions ▲ Refer to JEDEC J-STD-020E

Profile Features		Sn-Pb Eutetic Assembly	Pb-Free Assembly
Preheat temperature min.	$T_{s\ min}$	100 °C	150 °C
Preheat temperature max.	$T_{s\ max}$	150 °C	200 °C
Preheat time t_s from $T_{s\ min}$ to $T_{s\ max}$	t_s	120 seconds	120 seconds
Ramp-up rate (T_L to T_p)		max. 3 °C/second	max. 3 °C/second
Liquidous temperature	T_L	183 °C	217 °C
Time t_L maintained above T_L	t_L	150 seconds max.	60 seconds max.
Peak package body temperature	T_p	235°C	260°C
Timeframe of within 5°C below and up to max actual peak body temperature	t_p	20 seconds max.	30 seconds max.
Ramp-down rate (T_L to T_p)		max. 6 °C/second	max. 6 °C/second
Time 25°C to peak temperature		max. 6 minutes	max. 8 minutes

LOAD CONNECTING METHOD

Type	Load	Connection	Feature
4 pins	AC or DC		Control bi-directional signal
8 pins	AC or DC		2 input and 2 output
			1 input and 2 output

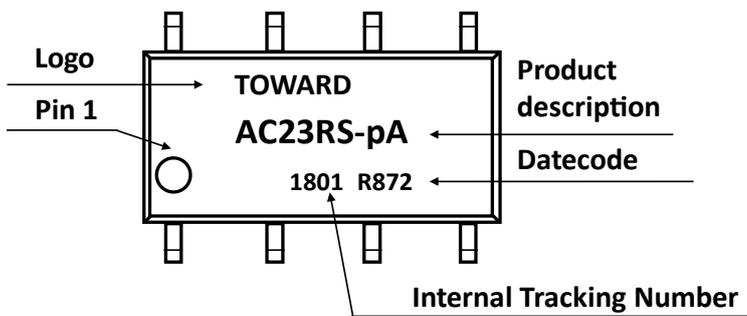
PRODUCT CODE

Example: AC23RS-pA series ▲ 2 Form A ▲ 250V ▲ SOP-8 ▲ Tape & Reel

AC		23R		S		pA		R1	
Package		Series		Type		Special Suffix		Packing	
AB	4 Pin ▲ 1 Form A	23R	250V	S	SOP	pA	Low Leakage	Blank R1	Tube Reel
AC	8 Pin ▲ 2 Form A								

PRODUCT MARKING

Example: AC23RS-pA series ▲ 2 Form A ▲ 250V ▲ SOP-8 ▲ Tape & Reel



DATE CODE

Example: R872

R		8		7		2	
Material Characteristics		Year		Month		Week of the Month	
R	RoHS compliant	8	2018	1	Jan	1	1 st
		9	2019	2	Feb		2 nd
		A	2020	3	Mar		3 rd
		B	2021	4	Apr		4 th
		C	2022	5	May		
H	Halogen free		
		G	2026	12	Dec		

RELIABILITY TESTS ▲ STANDARD

Standard: JESD22-A

No.	Test	Test Specification	Test Standard	Test Limits
1	Moisture Sensitivity Level Test	Bake condition: Temperature: 125°C; Duration 24 hours Soak condition: Temperature: 30°C; Humidity: 60% RH Duration 192 hours Reflow condition: Peak temperature: 260°C Duration: 3 cycles	JESD22-A113H	No abnormal phenomenon was found. Functional test passed.
2	High Temperature Storage Test	Temperature: 150°C Duration: 500 hours	JESD22-A103E	No abnormal phenomenon was found. Functional test passed.
3	Temperature Cycling Test	Temperature range: -55°C to +125°C -55°C for 30 minutes +125°C for 30 minutes Duration: 100 cycles with 1 cycle = 70 minutes	JESD22-A104E	No abnormal phenomenon was found. Functional test passed.
4	Low Temperature Storage Test	Temperature: -40°C Duration: 500 hours	JESD22-A119E	No abnormal phenomenon was found. Functional test passed.
5	Temperature & Humidity Storage Test	Temperature: 85°C Humidity: 85% RH Duration: 500 hours	JESD22-A101D	No abnormal phenomenon was found. Functional test passed.
6	Highly Accelerated Temperature and Humidity Stress Test	Temperature: 130°C Humidity: 85% RH Duration: 96 hours	JESD22-A-118B	No abnormal phenomenon was found. Functional test passed.

REVISION TABLE

Revision	Date	Status	Notes
001	01/10/2021	Initial release	Initial publication

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