

AK74 SERIES

GENERAL PURPOSE ▲ Si MOSFET RELAY

SILICON Si MOSFET RELAY ▲ DIP and SMD type

Switches AC or DC load

Normally open and normally closed switch in one package

Input TTL / CMOS compatible








Moisture Sensitivity Level ▲ MSL 1

 **UL 1577 approved ▲** File no E344988

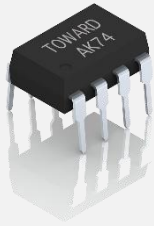
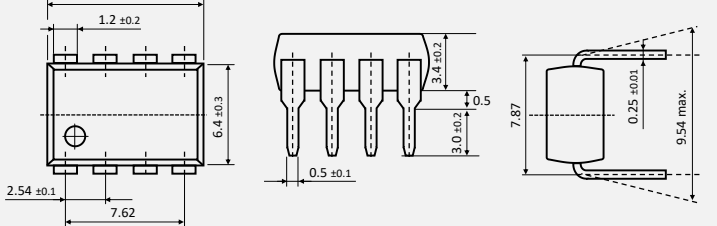
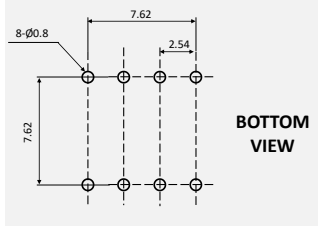
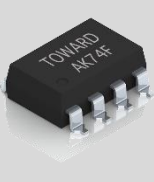
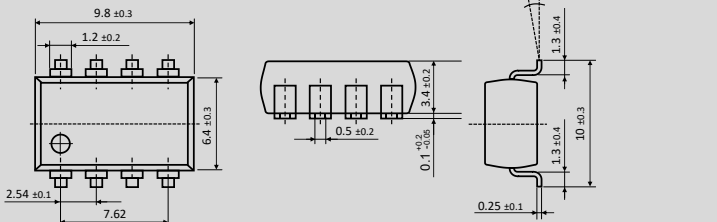
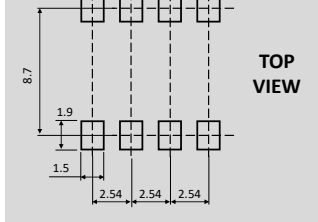
SPECIFICATION

Item		Characteristics
Contact Form		1 Form A / 1 Form B ▲ Normally open / closed switch
Load Voltage	V_L	400V
Operation LED Current	$I_{F\ ON}$	3mA
Load Current	I_L	100mA
On-Resistance	R_{ON}	24Ω / 28Ω
Output Capacitance	C_{OUT}	100pF / 165pF
Low Off-State Leakage Current	I_{LEAK}	10μA at 400V _{DC}


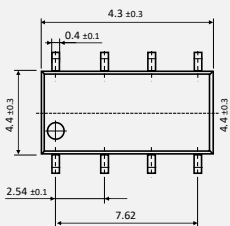
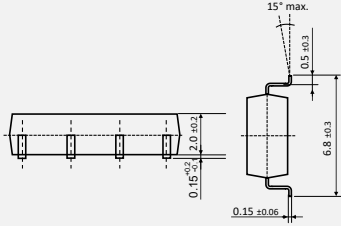
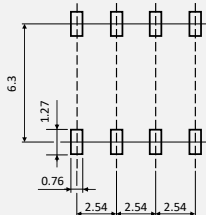
APPLICATIONS

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

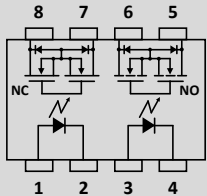
DIMENSIONS

Package	Illustration	Dimensions	PCB Board Pattern
DIP-8			
SMD-8			

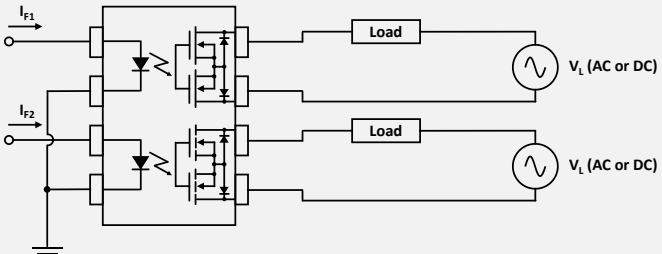
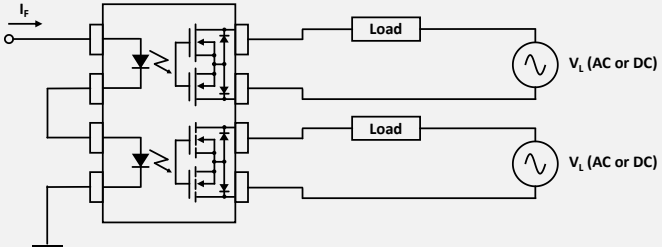
DIMENSIONS

Package	Illustration	Dimensions	PCB Board Pattern
SOP-8		 	 <p>TOP VIEW</p>

PIN DESCRIPTION AND PART NUMBER

Circuit Diagram	Pin Description	Part No.	Package	Packing
	1,3 Anode (+) ■ LED 2,4 Cathode (-) ■ LED 5,6,7,8 Drain ■ MOSFET	AK74 AK74F AC74S AK74F-R1 AK74S-R1	DIP-8 SMD-8 SOP-8 SMD-8 SOP-8	Tube (45pcs) Tube (45pcs) Tube (50pcs) Reel (1000pcs) Reel (1000pcs)

LOAD CONNECTING METHOD

Type	Load	Connection	Feature
8 pins	AC or DC		2 input and 2 output
			1 input and 2 output

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

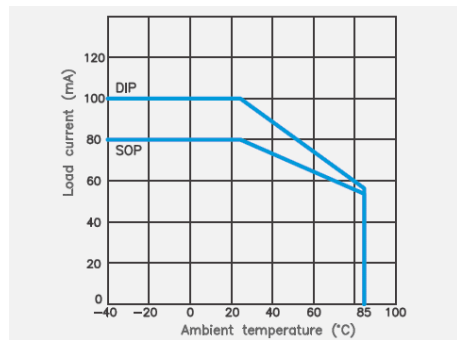
	Item	Condition	Symbol	Value			Unit
Type	Outline package			DIP-8	SMD-8	SOP-8	
	Part number			AK74	AK74F	AK74S	
	Output channels			2 (1a + 1b)	2 (1a + 1b)	2 (1a + 1b)	Channel
Input	Continuous LED Current		I_F	50			mA
	Peak LED Current	100 Hz, Duty 1%	I_{FP}	500			mA
	LED Reverse Voltage		V_R	5			V
	Input Power Dissipation		P_{IN}	75			mW
Output	Load Voltage		V_L	400 (AC peak or DC)			V
	Load Current		I_L	100(NO) 70(NC)	100(NO) 70(NC)	80(NO) 60(NC)	mA
	Peak Load Current	1 ms, 1 shot	I_{PEAK}	400	400	400	mA
	Output Power Dissipation		P_{OUT}	600	600	400	mW
Relay	Total Power Dissipation		P_T	650	650	450	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 $T_A = 25^\circ\text{C}$

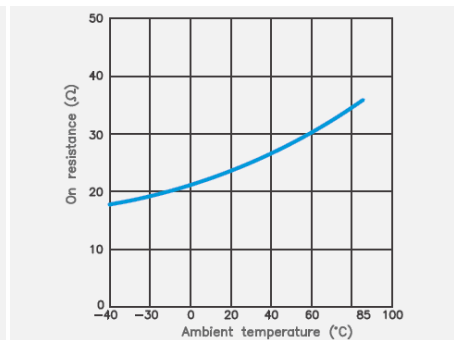
	Item	Condition	Symbol	Min.	Typ.	Max.	Unit
Input	LED Forward Voltage	$I_F = 10\text{mA}$	V_F	1	1.17	1.5	V
	Operation LED Current		I_{FON}		0.6	3	mA
	Recovery LED Voltage		V_{FOFF}	0.5	1		V
Output	On-Resistance Drain to Drain (tested within 1 sec.)	$I_F=5\text{mA (NO)},$ $I_F=0\text{mA (NC)},$ $I_L=\text{Rating}$	R_{ON}		24(NO) 28(NC)	30(NO) 35(NC)	Ω
	Off-State Leakage Current	$I_F=0\text{mA (NO)},$ $I_F=5\text{mA (NC)},$ $V_L = 400\text{V}$	I_{LEAK}			1(NO) 10(NC)	μA
	Output Capacitance	$I_F=0\text{mA (NO)},$ $I_F=5\text{mA (NC)},$ $V_L=0\text{V}, f=1\text{MHz}$	C_{OUT}		100(NO) 165(NC)		pF
Trans- mission	Turn-On Time (for SOP type)	$I_F=5\text{mA}, I_L=\text{Rating}$	$t_{ON_(\text{NO})}$ $t_{ON_(\text{NC})}$		0.2(NO) 0.1(NC)	1	ms
	Turn-Off Time (for SOP type)	$I_F=5\text{mA}, I_L=\text{Rating}$	$t_{OFF_(\text{NO})}$ $t_{OFF_(\text{NO})}$		0.05	0.5	ms
	Turn-On Time (for DIP/SMD type)	$I_F=10\text{mA}, I_L=\text{Rating}$	$t_{ON_(\text{NO})}$ $t_{ON_(\text{NC})}$		0.2(NO) 0.15(NC)	1	ms
	Turn-Off Time (for DIP/SMD type)	$I_F=10\text{mA}, I_L=\text{Rating}$	$t_{OFF_(\text{NO})}$ $t_{OFF_(\text{NO})}$		0.05	0.5	ms
Coupled	I/O Insulation Resistance		$R_{I/O}$	10^9			Ω
	I/O Capacitance	$f=1\text{MHz}$	$C_{I/O}$		1.3		pF

REFERENCE DATA

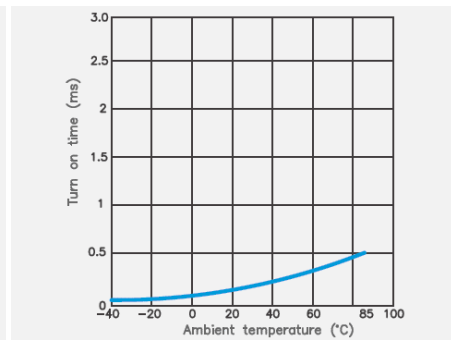
Load current vs. ambient temp.



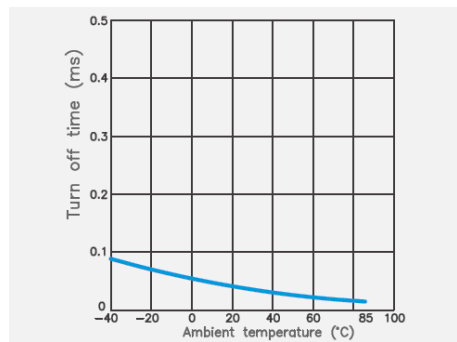
On resistance vs. ambient temp.



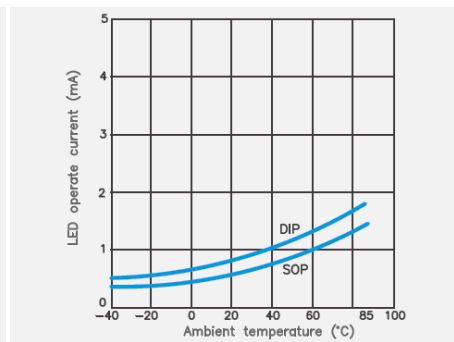
Turn on time vs. ambient temp.



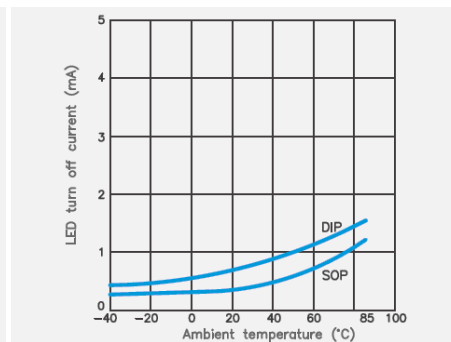
Turn off time vs. ambient temp.



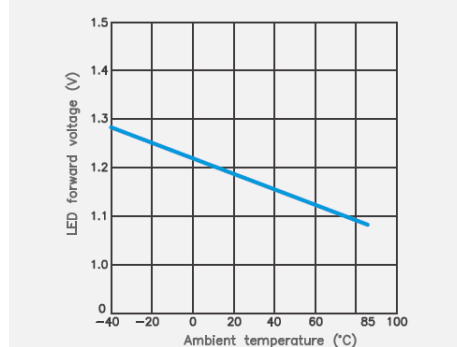
LED operate current vs. ambient temp



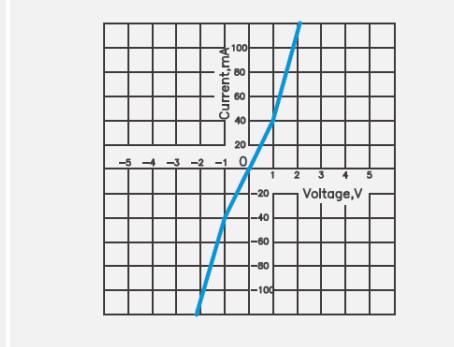
LED turn off current vs. ambient temp.



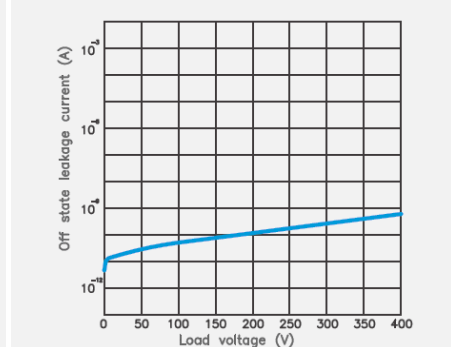
LED forward voltage vs. ambient temp.



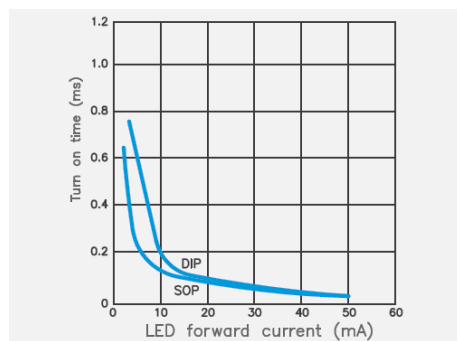
Current vs. voltage characteristics of output at MOS portion



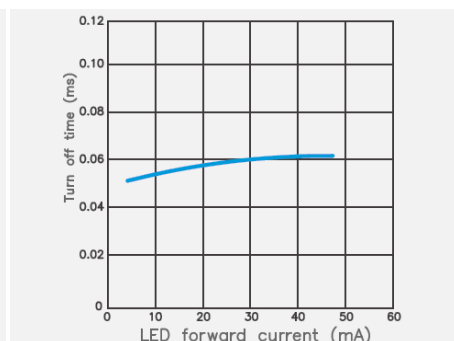
Off state leakage current vs. load voltage



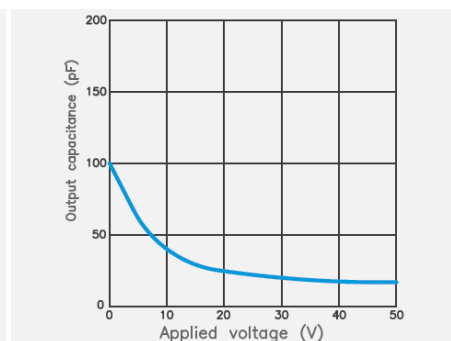
Turn on time vs. LED forward current



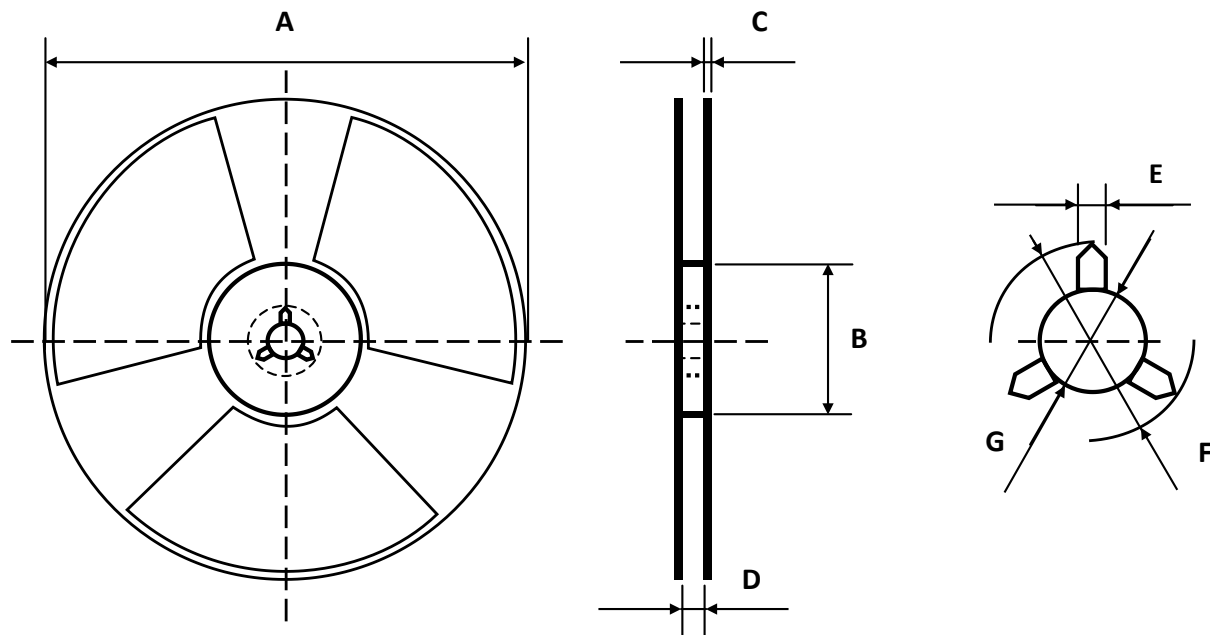
Turn off time vs. LED forward current



Output capacitance vs. applied voltage

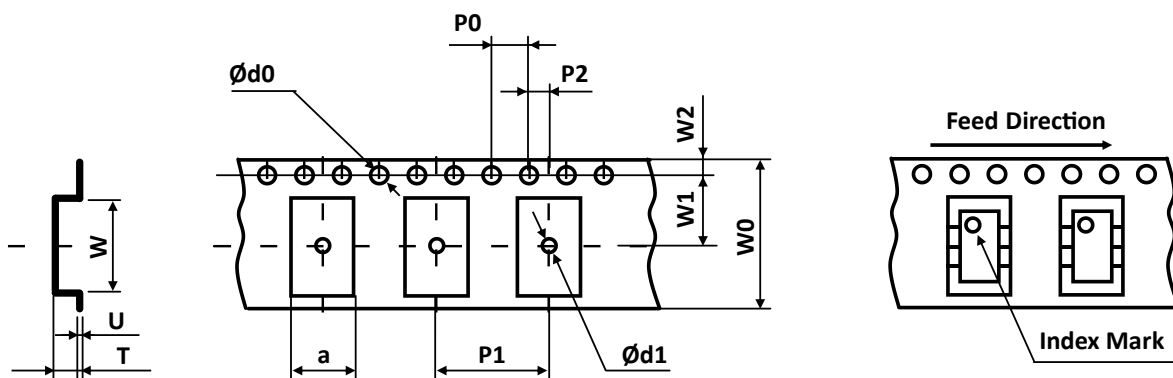


REEL DIMENSIONS ▲ All dimensions in mm



Size	A	B	C	D	E	F	G
SOP-8	330	100	2	17	2	13	21
SMD-8	380	80	2.2	17	2	13	21

TAPE DIMENSIONS ▲ All dimensions in mm



Size	W	U	T	a	Ød0	Ød1	P0	P1	P2	W0	W1	W2
SOP-8	10.4	0.3	2.3	7.5	1.5	1.5	4	12	2	16	7.5	1.75
SMD-8	9.9	0.3	4	10.6	1.5	1.5	4	16	2	16	7.5	1.75



PACKING QUANTITIES

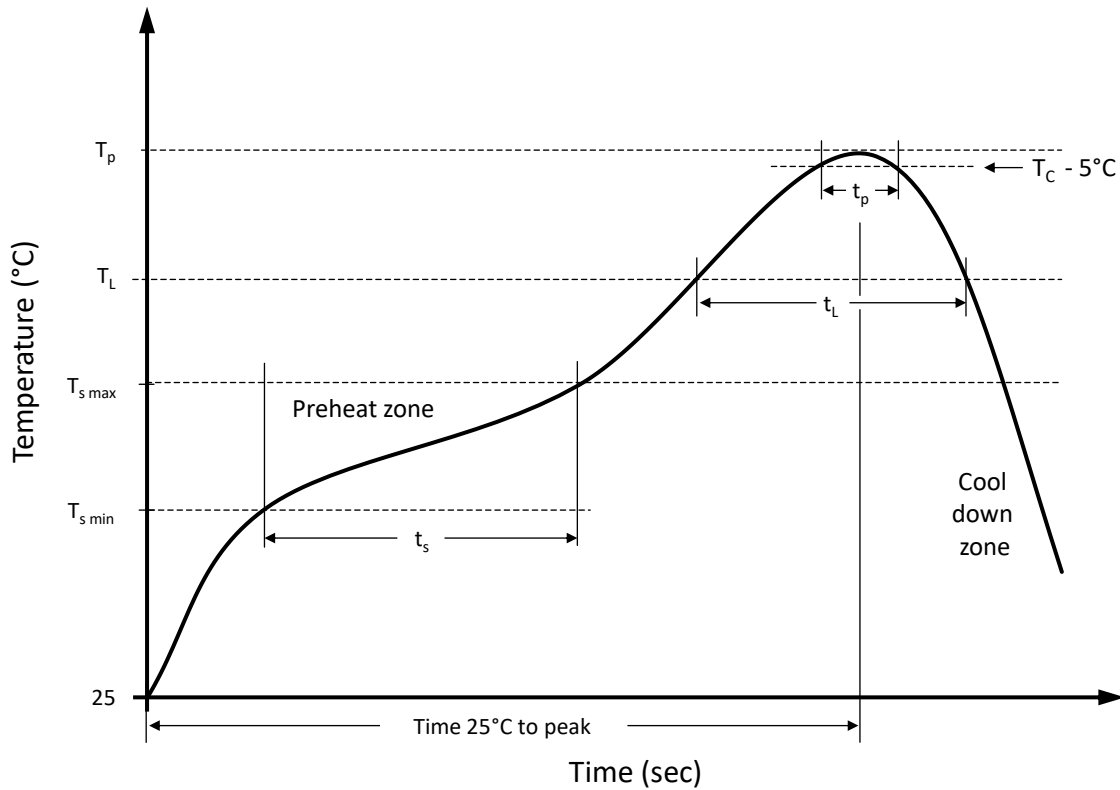
Tape and Reel Packing	PCS/Reel
SMD-8	1 000
SOP-8	1 000

Tube Packing	PCS/Tube	Tubes/Box	Units/Box
DIP-8	45	30	1 350

STORAGE AND HANDLING CONDITIONS

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

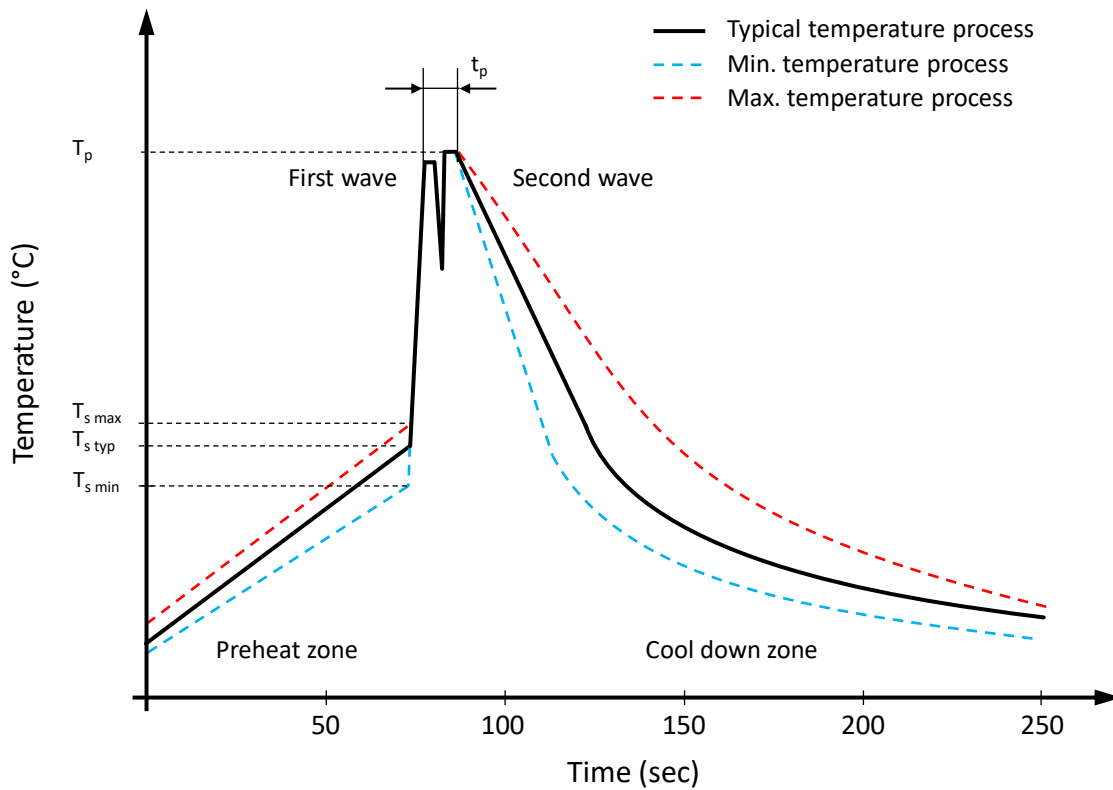
RECOMMENDED REFLOW SOLDERING PROFILE ▲ SMD PACKAGE



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

RECOMMENDED WAVE SOLDERING PROFILE ▲ THT PACKAGE



Classification wave soldering profile ▲ Refer to EN 61760-1: 2006

Profile Features		Value ▲ Sn-Pb Assembly	Value ▲ Pb-free Assembly
Preheat temperature min.	$T_{s \min}$	100 °C	100 °C
Preheat temperature typical	$T_{s \text{ typ}}$	120 °C	120 °C
Preheat temperature max.	$T_{s \max}$	130 °C	130 °C
Preheat time t_s from $T_{s \min}$ to $T_{s \max}$	t_s	70 seconds	70 seconds
Peak temperature	T_p	235 °C to 260 °C	245 °C to 260 °C
Time of actual peak temperature	t_p	Max. 10 seconds Max. 5 second each wave	Max. 10 seconds Max. 5 second each wave
Ramp-down rate min.		~ 2 °C/second	~ 2 °C/second
Ramp-down rate typical		~ 3.5 °C/second	~ 3.5 °C/second
Ramp-down rate max.		~ 5 °C/second	~ 5 °C/second
Time 25°C to 25°C		4 minutes	4 minutes

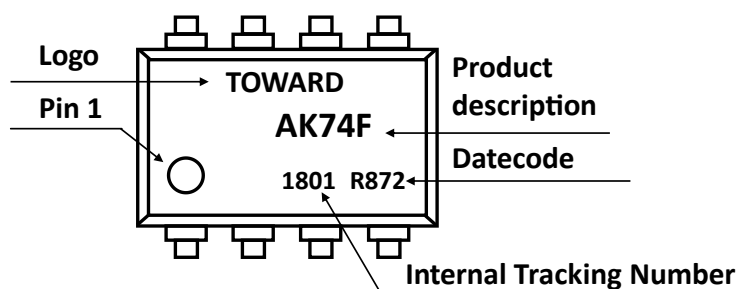
PRODUCT CODE

Example: AK74F series ▲ 1 Form A / 1 Form B ▲ 400V ▲ SMD-8 ▲ Tape & Reel

AK		74		F		R1	
Package		Series		Type		Packing	
AK	8 Pin ▲ 1 Form A 1 Form B	74	400V	Blank F S	DIP SMD SOP	Blank R1	Tube Reel

PRODUCT MARKING

Example: AK74F series ▲ 1 Form A / 1 Form B ▲ 400V ▲ SMD-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
H	Halogen free	C	2022	5	May	2	1 st
			2 nd
		G	2026	12	Dec		3 rd
							4 th

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

DISCLAIMER

Except for the written expressed warranties, MGT does not implicitly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any MGT product.

All information and technical specifications made available by MGT are for guidance only and we reserve the right to change or modify them without prior notice. Unless expressly stated in writing by MGT, we reject any guarantees, obligations, or warranties.

All MGT products with the technical specifications described are suitable for use in certain applications. Operating, production, storage and environmental conditions can have a massive influence on the parameters mentioned in the data sheets, which cause the performance to vary over time.

It is subject to the user's duty of care to design and validate his products in such a way that appropriate measures are taken, such as protective circuits or redundant systems to ensure the safety standards required in the application.

MGT components are not designed or rated for use in life support, rescue, safety critical, military, or aerospace applications where failure or malfunction could result in property or environmental damage, serious injury or death. In the aforementioned cases, please contact us before using MGT products.

In principle, we reserve all rights and MGT's general terms and conditions apply. You can find them on our website www.mgt.co.com.