

ULN2803AP, ULN2803AFW, ULN2804AP, ULN2804AFW

8CH DARLINGTON SINK DRIVER

The ULN2803AP/AFW Series are high-voltage, high-current darlington drivers comprised of eight NPN darlington pairs.

All units feature integral clamp diodes for switching inductive loads

Applications include relay, hammer, lamp and display (LED) drivers.

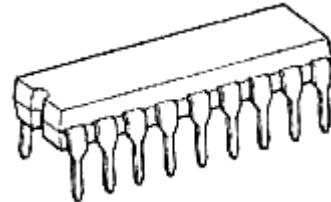
FEATURES

- Outputs current (Single output)
500mA (Max.) (ULN2803AP/AFW series)
- High sustaining voltage output
50V (Min.) (ULN2803AP/AFW series)
- Output clamp diodes
- Inputs compatible with various types of logic.
- Package type-AP :DIP-18pin
- Package type-AFW :SOL-18pin

TYPE	INPUT BASE RESISTOR	DESIGNATION
ULN2803AP/AFW	2.7K Ω	TTL,5V CMOS
ULN2804AP/AFW	10.5K Ω	6~15V PMOS, CMOS

ULN2803AP

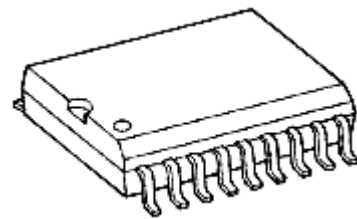
ULN2804AP



DIP 18-P-300-2.54F

ULN2803AFW

ULN2804AFW



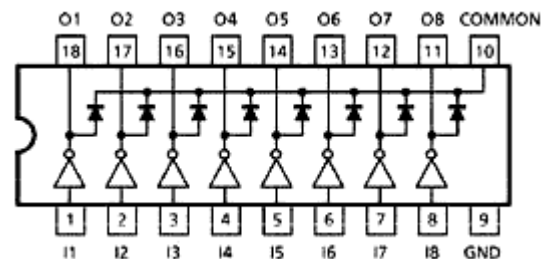
SOL 18-P-300-1.27

Weight

DIP18-P-300-2.54F : 1.478g (Typ.)

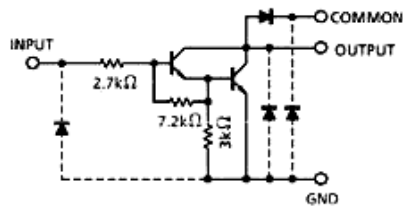
SOL18-P-300-1.27 : 0.48g (Typ.)

PIN CONNECTION (TOP VIEW)

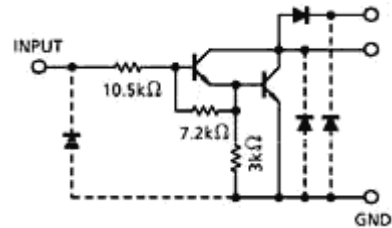


SCHEMATICS (EACH DRIVER)

ULN2803AP/AFW



ULN2804AP/AFW



(Note) The input and output parasitic diodes cannot be used as clamp diodes.

MAXIMUM RATING (Ta=25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Output Sustaining Voltage	$V_{CE(SUS)}$	-0.5~50	V
Output Current	I_{OUT}	500	mA/ch
Input Voltage	V_{IN}	-0.5~30	V
Clamp Diode Reverse Voltage	V_R	50	V
Clamp Diode Forward Current	I_F	500	mA
Power Dissipation	AP	P_D	1.47
	AFW		0.92/1.31 (Note)
Operating Temperature	T_{opr}	-40~85	°C
Storage Temperature	T_{stg}	-50~150	°C

(Note) On Glass Epoxy PCB (75 x 114 x 1.6mm Cu 20%)

RECOMMENDED OPERATING CONDITIONS (Ta = -40~85°C)

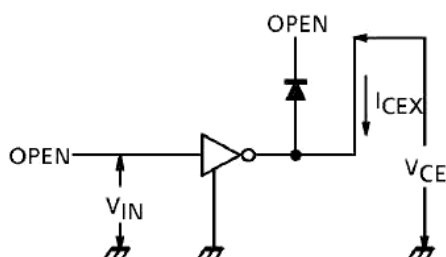
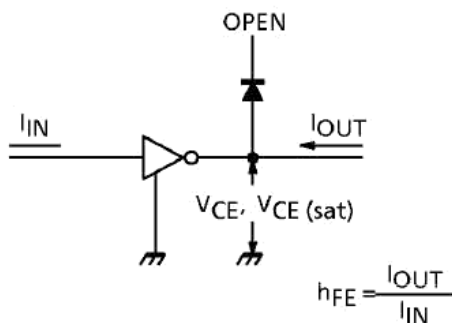
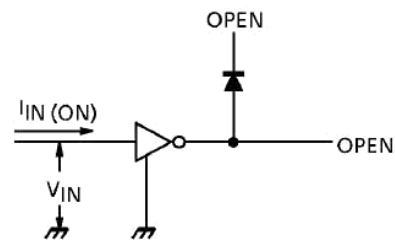
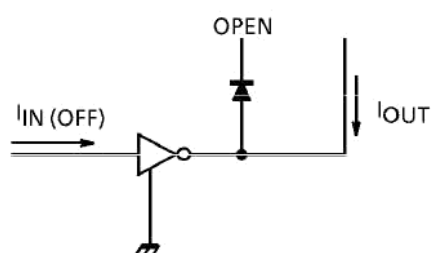
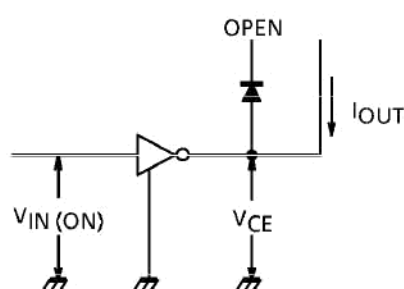
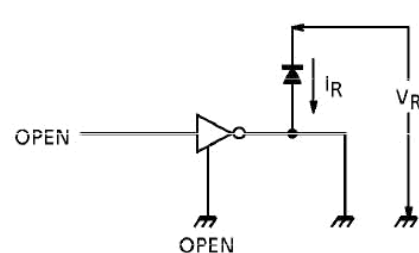
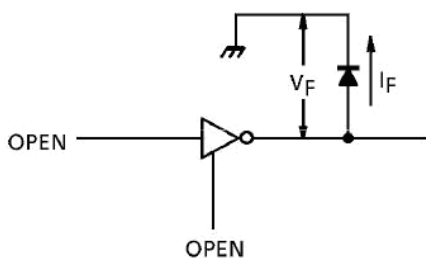
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Sustaining Voltage	$V_{CE(SUS)}$		0	-	50	V
		$T_{pw} = 25ms$, Duty=10%	0	-	347	
		8 Circuits				
	AP	$T_{pw}=25ms$, Duty =50%,	0	-	123	
		8 Circuits				
Output Current	I_{OUT}	$T_{pw}=25ms$, Duty =10%,	0	-	268	mA/ch
		8 Circuits				
	AFW	$T_{pw}=25ms$, Duty =50%,	0	-	90	
		8 Circuits				
Input Voltage	V_{IN}		0	-	30	V
Input Voltage	ULN2803AP/AFW	$V_{IN(ON)}$	3.5	-	30	V
	ULN2804AP/AFW		8	-	30	
Clamp Diode Reverse Voltage	V_R		-	-	50	v
Clamp Diode Forward Current	I_F		-	-	400	mA
Power Dissipation	AP	P_D	$T_a = 85^\circ C$	-	0.76	w
	AFW		$T_a=85^\circ C$ (Note)	-	0.48	

(Note) On Glass Epoxy PCB (75 x 114 x 1.6 mm Cu 20%)

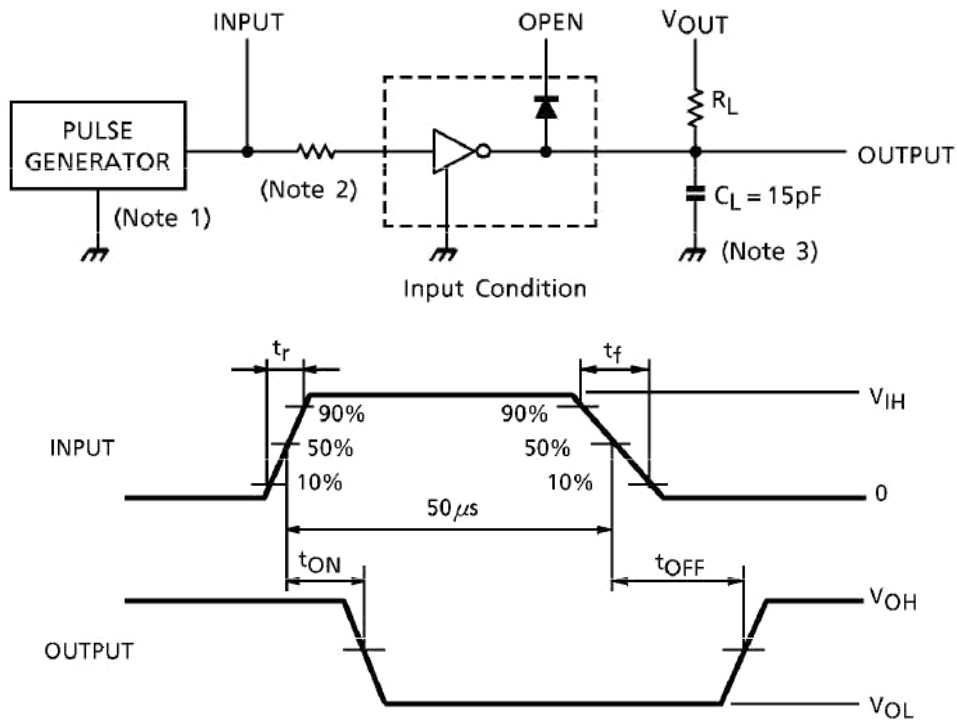
ELECTRICAL CHARACTERISTICS (Ta=25°C)

CHARACTERISTIC			SYMBOL	TEST CIRCUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Leakage Current			I _{CEX}	1	V _{CE} =50V	Ta=25°C	-	-	50	μA
					V _{CE} =50V	Ta=85°C	-	-	100	
					V _{CE} =50V	V _{IN} =1V	-	-	500	
Collector-Emitter Saturation Voltage			V _{CE(sat)}	2	I _{OUT} =350mA, I _{IN} =500μA		-	1.3	1.6	V
					I _{OUT} =200mA, I _{IN} =350μA		-	1.1	1.3	
					I _{OUT} =100mA, I _{IN} =250μA		-	0.9	1.1	
Input Current		ULN2803AP/AFW	I _{IN(ON)}	2	V _{IN} =3.85V		-	0.93	1.35	mA
		ULN2803AP/AFW			V _{IN} =5V		-	0.35	0.5	
					V _{IN} =12V		-	1.0	1.45	
			I _{IN(OFF)}	4	I _{OUT} =500μA, Ta=85°C		50	65	-	μA
Input Voltage (Output On)		ULN2803AP/AFW	V _{IN(ON)}	5	V _{CE} =2V, I _{OUT} =200mA		-	-	2.4	V
					V _{CE} =2V, I _{OUT} =250mA		-	-	2.7	
					V _{CE} =2V, I _{OUT} =300mA		-	-	3.0	
		ULN2804AP/AFW			V _{CE} =2V, I _{OUT} =125mA		-	-	5.0	
					V _{CE} =2V, I _{OUT} =200mA		-	-	6.0	
					V _{CE} =2V, I _{OUT} =275mA		-	-	7.0	
					V _{CE} =2V, I _{OUT} =350mA		-	-	8.0	
DC Current Transfer Ratio			h _{FE}	2	V _{CE} =2V, I _{OUT} =350mA		1000	-	-	
Clamp Diode Reverse Current			I _R	6	Ta=25°C (Note)		-	-	50	μA
					Ta=85°C (Note)		-	-	100	
Clamp Diode Forward Voltage			V _F	7	I _F =350mA		-	-	2.0	V
Input Capacitance			C _{IN}	-			-	15	-	pF
Turn-On Delay			t _{ON}	8	R _L =125Ω, V _{OUT} =50V		-	0.1	-	μS
Turn-Off Delay			t _{OFF}		R _L =125Ω, V _{OUT} =50V		-	0.2	-	

 (Note) V_R = V_R MAX.

TEST CIRCUIT
1. I_{CEX}

2. $V_{CE(sat)}$, h_{FE}

3. $I_{IN(ON)}$

4. $I_{IN(OFF)}$

5. $V_{IN(ON)}$

6. I_R

7. V_F


8. t_{ON}, t_{OFF}



(Note 1) Pulse Width 50μs, Duty Cycle 10%
Output Impedance 50Ω, $t_r \leq 5ns$, $t_f \leq 10ns$

(Note 2) See below.

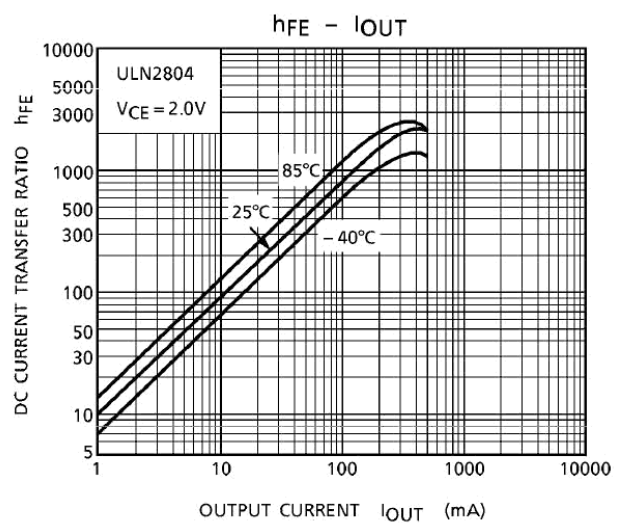
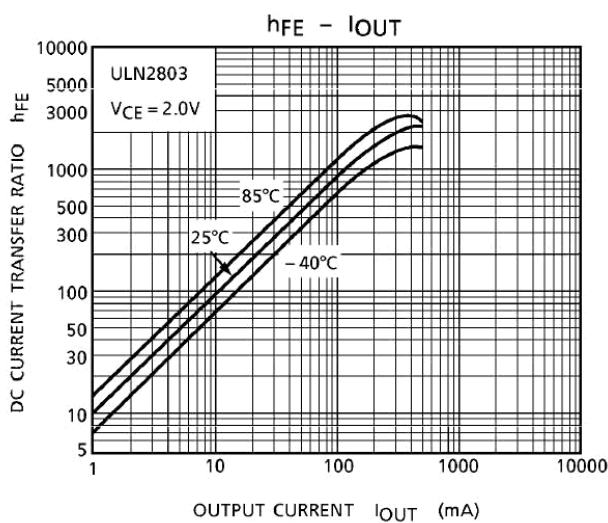
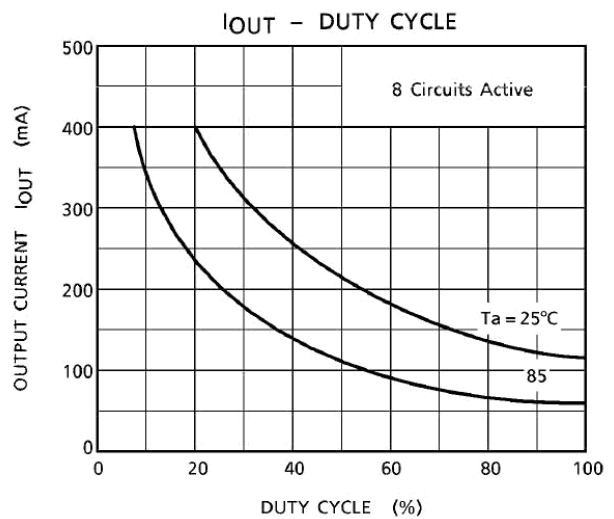
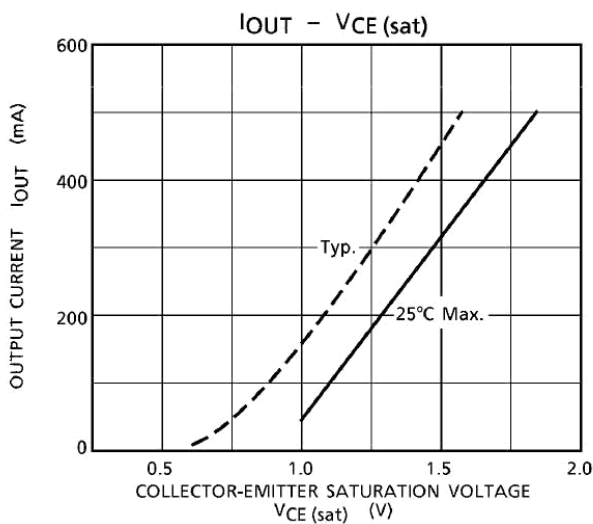
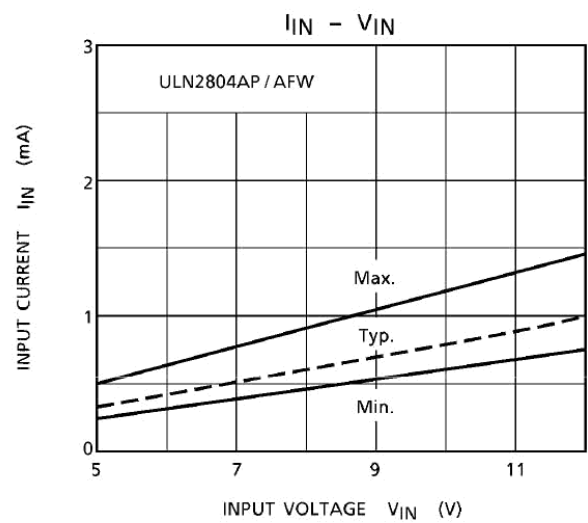
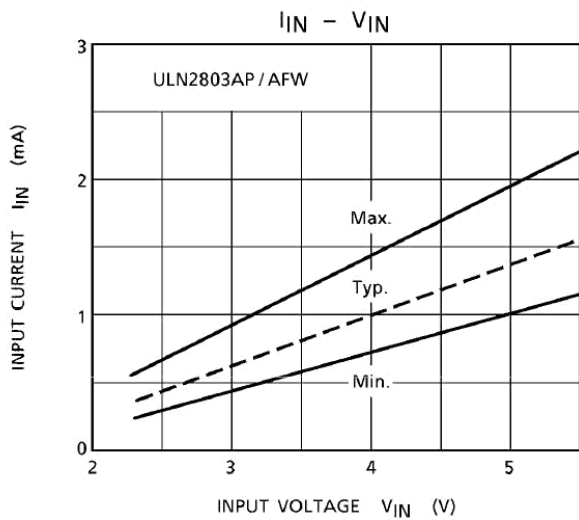
INPUT CONDITION

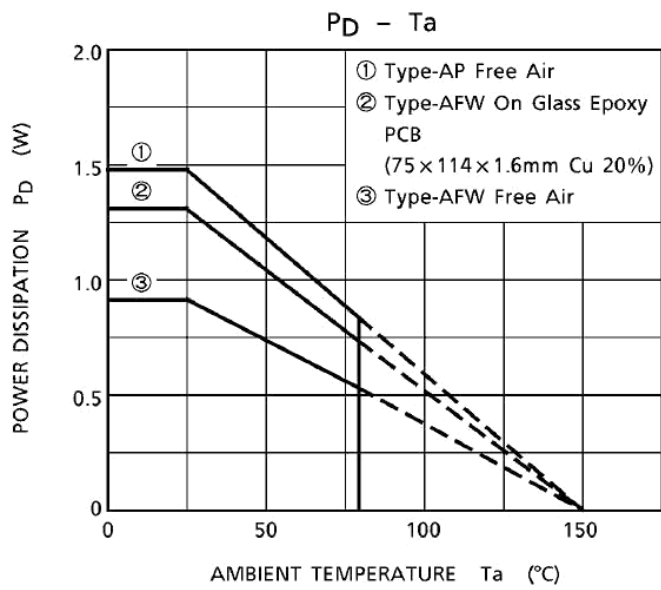
TYPE NUMBER	R1	V_{IH}
ULN2803AP/AFW	0Ω	3V
ULN2804AP/AFW	0Ω	8V

(Note 3) C_L includes probe and jig capacitance.

PRECAUTIONS for USING

Utmost care is necessary in the design of the output line, COMMON and GND line since IC may be destroyed due to short-circuit between outputs, air contamination fault, or fault by improper grounding.

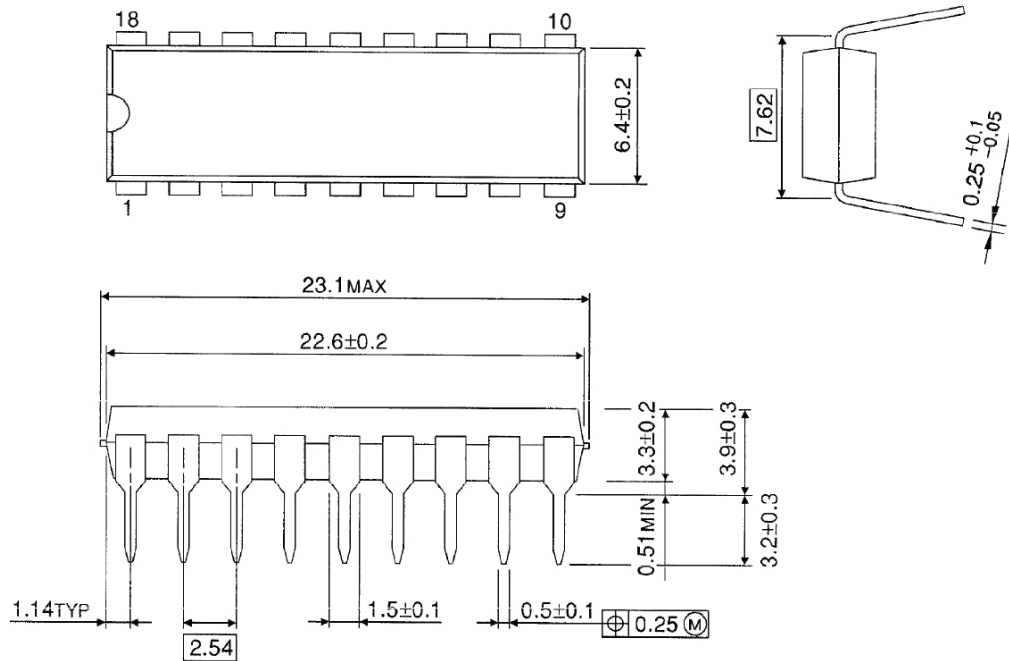




OUTLINE DRAWING

DIP18-P-300-2.54F

Unit:mm

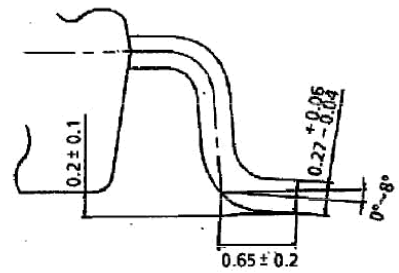
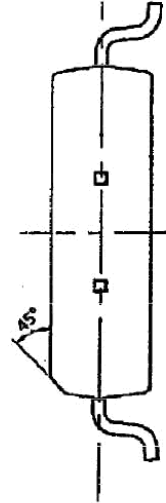
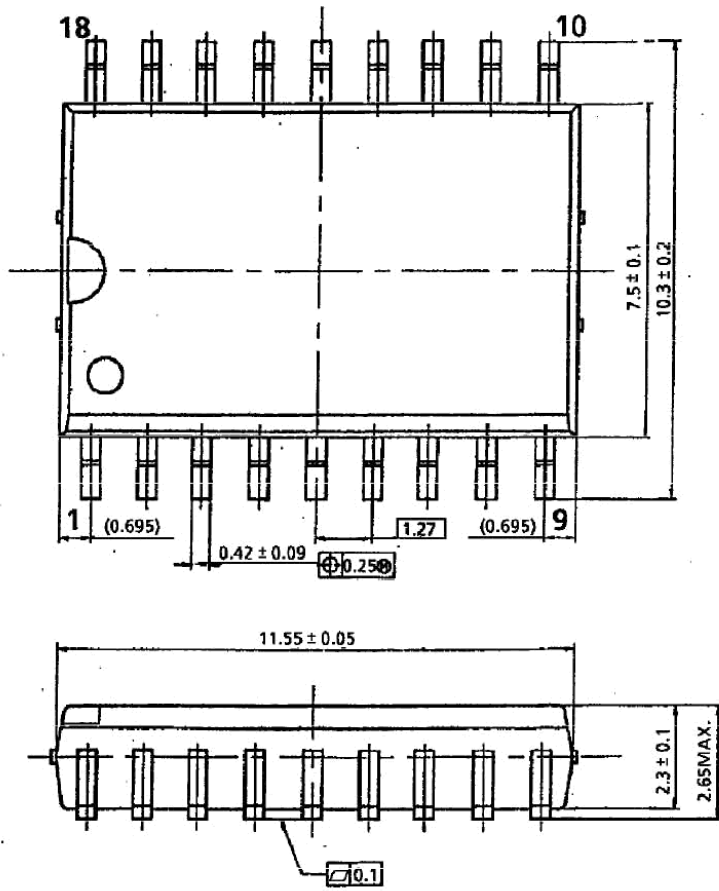


Weight:1.478g (Typ.)

OUTLINE DRAWING

SOL18-P-300-1.27

Unit:mm



Weight : 0.48g (Typ.)