

aPR2060 --- H2.2

Datasheet

40 ~ 80 sec recording voice IC

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● FEATURES :

- Operating Voltage Range: 3V ~ 6.5V
- Single Chip, High Quality Audio/Voice Recording & Playback Solution
 - No External ICs Required
 - Minimum External Components
- User Friendly, Easy to Use Operation
 - Programming & Development Systems Not Required
- 40 ~ 80 sec. Voice Recording Length
- Powerful 16-Bits Digital Audio Processor.
- Nonvolatile Flash Memory Technology
 - No Battery Backup Required
- External Reset pin.
- Powerful Power Management Unit
 - Very Low Standby Current: 1uA
 - Low Power-Down Current: 10uA
 - Supports Power-Down Mode for Power Saving
- Built-in Audio-Recording Microphone Amplifier
 - No External OPAMP or BJT Required
 - Easy to PCB layout
- Configurable analog interface
 - Differential-ended MIC pre-amp for Low Noise
 - High Quality Line Receiver
- High Quality Analog to Digital, DAC and PWM module
 - Resolution up to 16-bits
- Simple And Direct User Interface
- one messages 40s to 60s record & playback
- Adjustable sample rates` by external resistors

● DESCRIPTION :

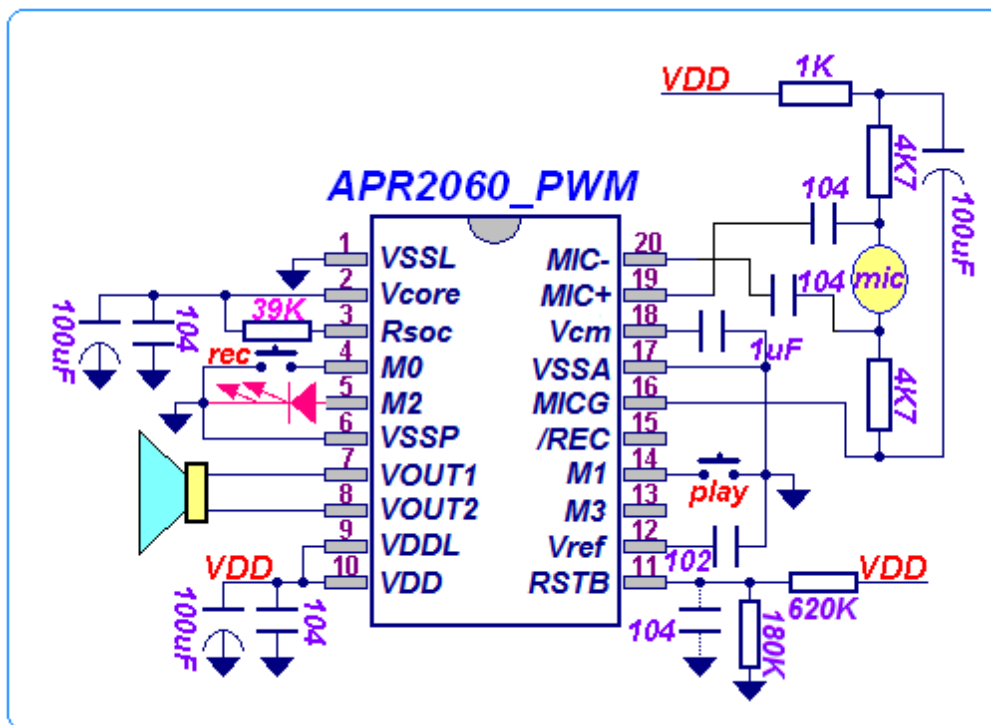
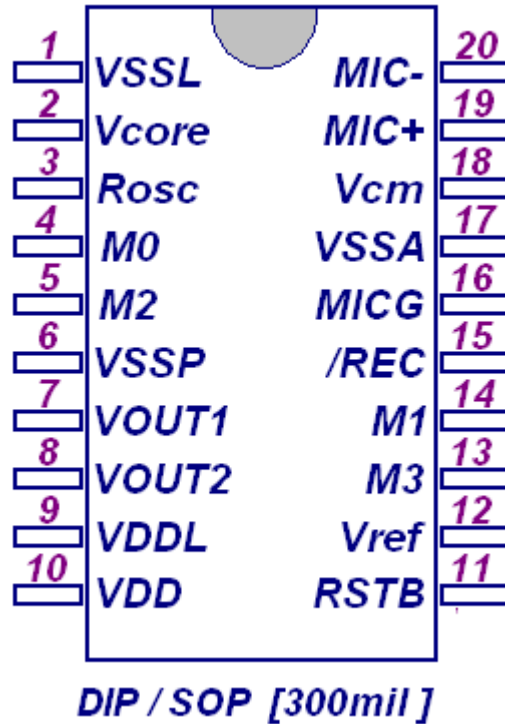
Today's consumers demand the best in audio/voice. They want crystal-clear sound wherever they are in whatever format they want to use. APLUS delivers the technology to enhance a listener's audio/voice experience.

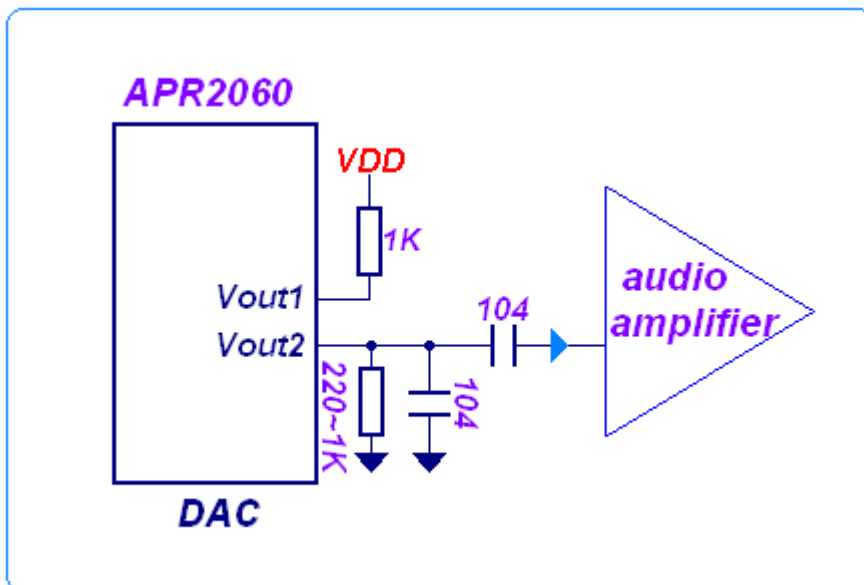
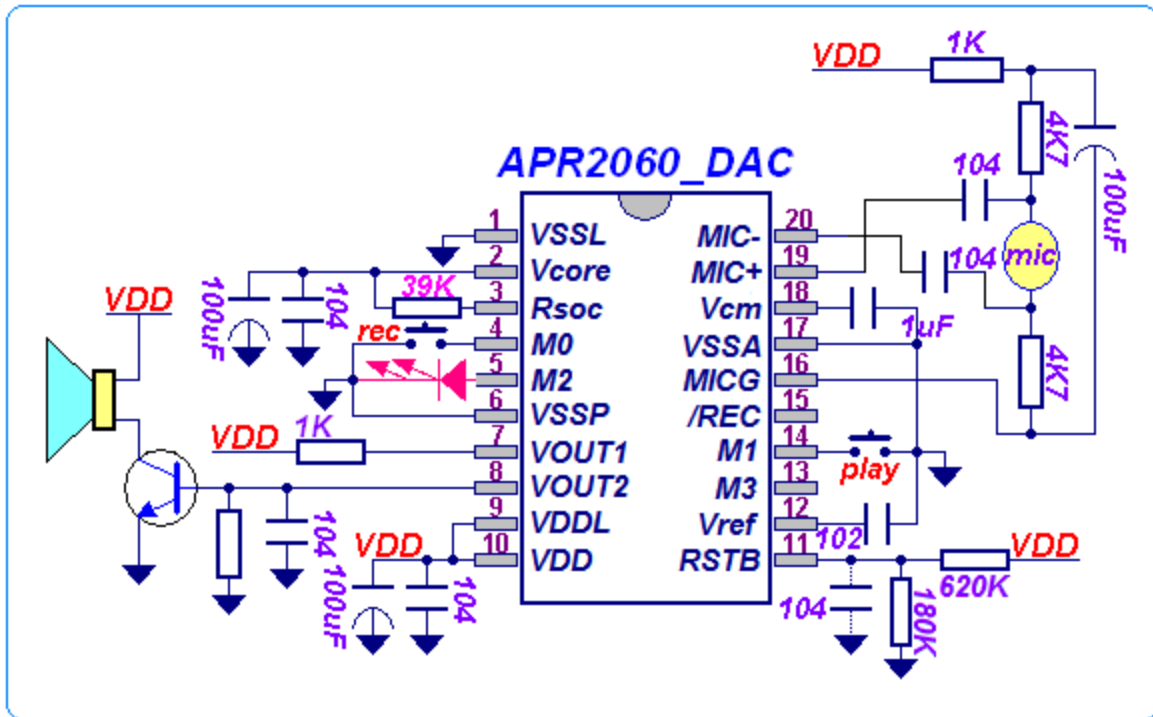
The aPR2060 is powerful audio processor along with high performance audio analog-to-digital converters (ADCs) and digital-to-analog converters (DACs). The aPR2060 are a fully integrated solution offering high performance and unparalleled integration with analog input, digital processing and analog output functionality. The aPR2060 incorporates all the functionality required to perform demanding audio/voice applications. High quality audio/voice systems with lower bill-of-material costs can be implemented with the aPR2060 because of its integrated analog data converters and full suite of quality-enhancing features such as sample-rate convertor.

The aPR2060 H2.2 is specially designed for 2 key trigger, user can record and playback the voice message by switch, It is suitable in simple interface or need to limit the length of single message, e.g. toys, leave messages system, answering machine etc.

Meanwhile, this mode provides the power-management system. Users can let the chip enter power-down mode when unused. It can effectively reduce electric current consuming to 10uA and increase the using time in any projects powered by batteries.

● **PIN CONFIGURATION :**





● PIN DESCRIPTION :

Pin Names	Pin No	TYPE	Description
VDDP VDD	9 10		Positive power supply.
VSSL VSSP VSSA	1 6 17		Power ground.
V _{CORE}	2		Positive power supply for core.
V _{REF}	12		Reference voltage.
V _{CM}	18		Common mode voltage.
Rosc	3	INPUT	Oscillator resistor input.
RSTB	11	INPUT	Reset. (Low active)
MIC+ MIC-	19 20	INPUT	Microphone differential input.
MICG	16	OUTPUT	Enable Microphone ground.
VOUT1	7	OUTPUT	PWM output to drive speaker directly. DAC option.[Vout1 pull high 1K Ohm]
VOUT2	8	OUTPUT	PWM output to drive speaker directly. DAC output.
/REC	15	INPUT	---
M0	4	INPUT	Record Voice Message
M1	14	INPUT	Play Voice Message
M2	5	INPUT	LED output
M3	13	INPUT	---

● **MESSAGE RECORD :**

- Start recording voice message :

When the [M0] key drove to VIL [VSS] in record mode, M2 LED on and message recording start.

- Stop recording voice message :

The message recording will continue until [M0] key released or full of this message, LED off and stop message recording.

If the message already exist and user record again, the old one's message will be replaced.

● **MESSAGE PLAYBACK :**

- Start playback voice message :

When the [M1] key drove from VIH to VIL in playback mode, the message playback start.

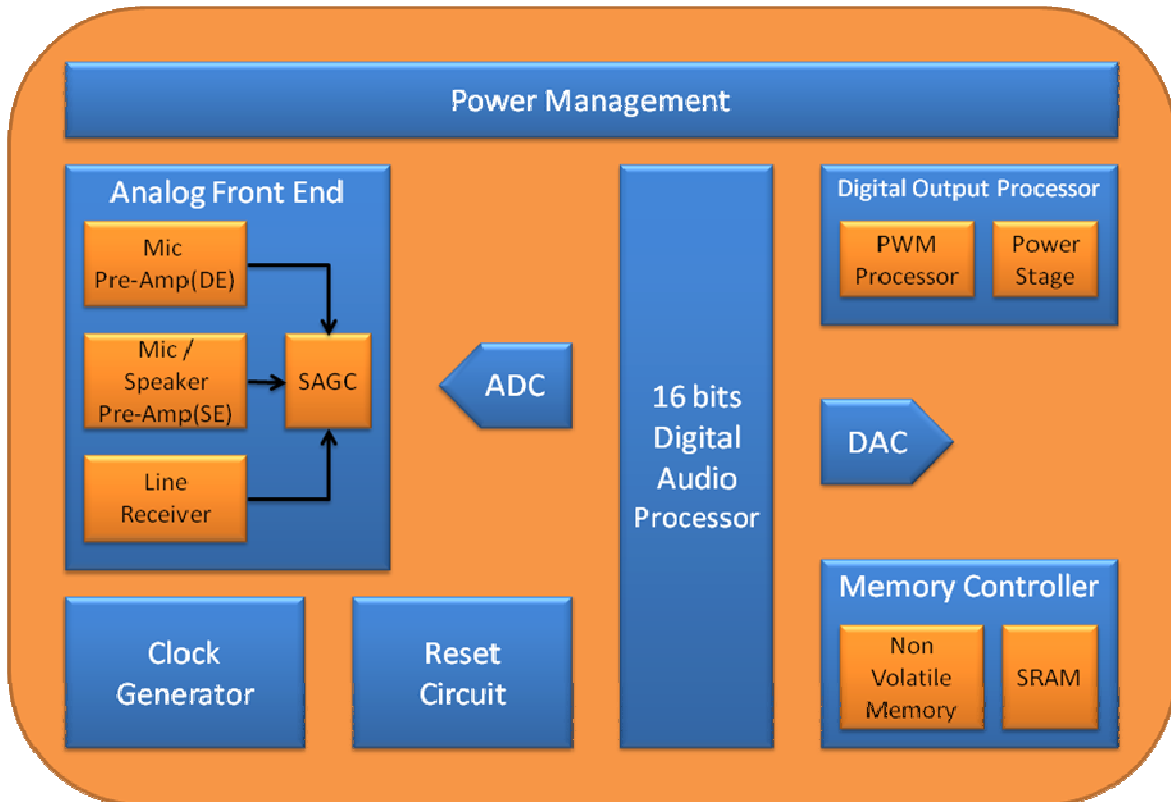
- Stop playback voice message :

The message playback will continue until [M1] key drove from VIH to VIL again or end of this message.

Note: After reset, M0 to M1 pin will be pull-up to VDD by internal resistor.

● **BLOCK DIAGRAM :**

Figure 1. Block Diagram



● **ABSOLUTE MAXIMUM RATINGS :**

Symbol	Rating	Unit
VDD – VSS	-0.3 ~ +10.0	V
V _{IN}	VSS-0.3 < V _{IN} < VDD+0.3	V
V _{OUT}	VSS < V _{OUT} < VDD	V
T(Operating)	-40 ~ +85	°C
T(Junction)	-40 ~ +125	°C
T(Storage)	-40 ~ +125	°C

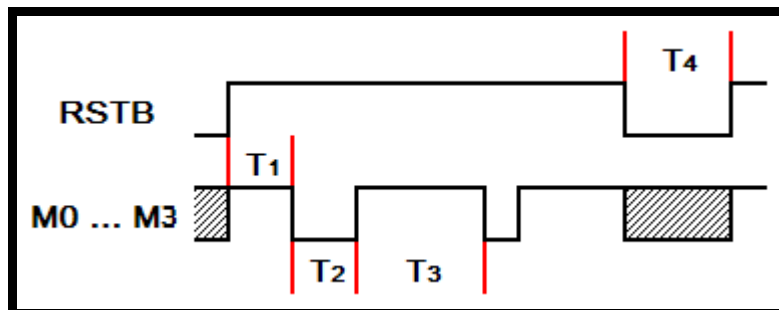
● DC CHARACTERISTICS :

Symbol	Parameter	Min.	Typ.	Max.	Unit	Conditions
VDD	Operating Voltage	3.0		6.5	V	
ISB	Standby Current			1	μA	
IPDN	Power-Down Current		10		μA	
IOP(IDLE)	Operating Current (Idle)		20		mA	VDD = 5V
IOP(REC)	Operating Current (Record)		35		mA	VDD = 5V
IOP(PLAY)	Operating Current (Playback)		25		mA	VDD = 5V
VIH	"H" Input Voltage	2.5			V	
VIL	"L" Input Voltage			0.6	V	
IvOUT	VOUT Current		185		mA	
IOH	O/P High Current		8		mA	VDD = 5V / VOH=4.5V
IOL	O/P Low Current		14		mA	VDD = 5V / VOH=0.5V
RNPIO	Input pin pull-down resistance		300		KΩ	External floating or drive low.
			1		MΩ	External drive high.
RUPIO	Input pin pull-up resistance		4.7		KΩ	
ΔFs/Fs	Frequency stability			5	%	VDD = 5V ± 1.0V
ΔFc/Fc	Chip to chip Frequency Variation			5	%	Also apply to lot to lot variation.

■ **SAMPLES RATES & RESISTANCE VALUES (for reference only)**

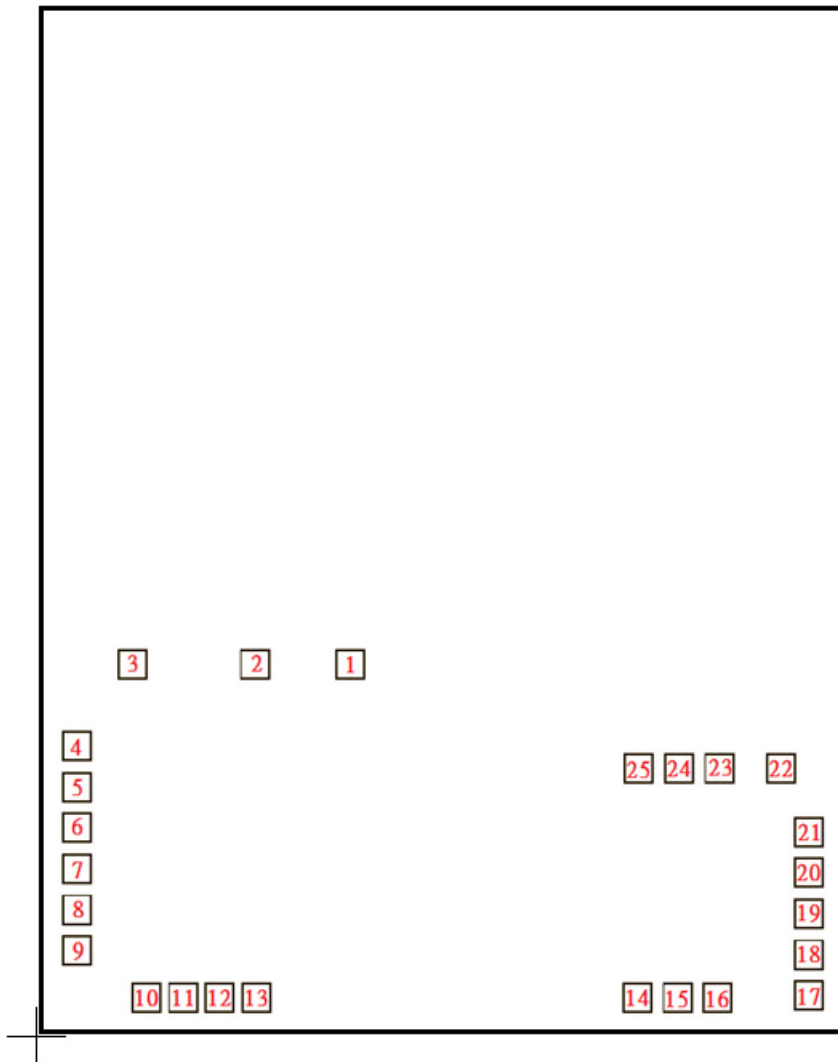
Sample Rate	Seconds	Resistance
12KHz	42 sec	47K
11KHz	46 sec	63K
10KHz	51 sec	79K
9KHz	56 sec	100K
8KHz	64 sec	120K
7KHz	73 sec	143K
6KHz	85 sec	173K

● **AC CHARACTERISTICS :**



Symbol	Parameter	Min.	Typ.	Max.	Unit	Conditions
T1	System Initial Time	100	--	--	mS	VDD=5.0V
T2	Trigger Setup Time	16	--	--	mS	VDD=5.0V
T3	Trigger Hold Time	16	--	--	mS	VDD=5.0V
T4	Reset Hold Time	100	--	--	uS	VDD=5.0V

● **BONDING PAD DIAGRAMS :**

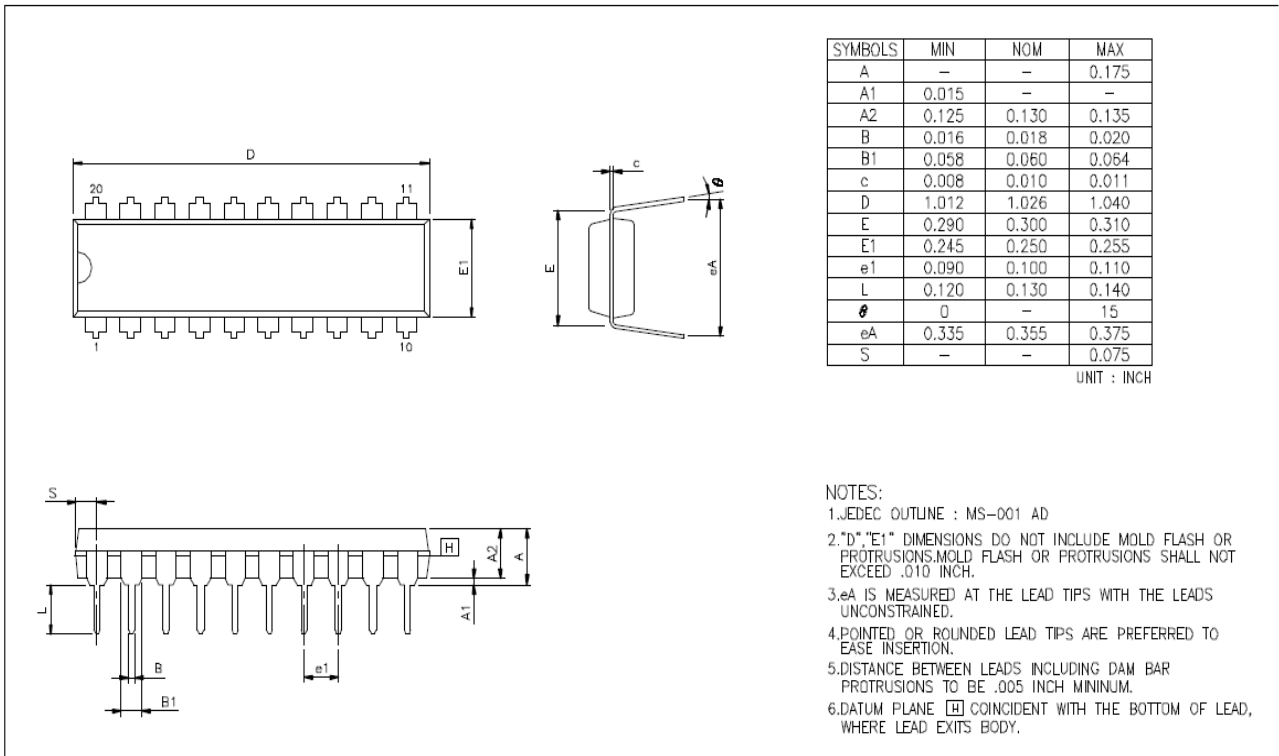


Die Size		2400 X 3000					
Pad Size		80 X 80					
Pad No	Pad Name	Pad Location		Pad No	Pad Name	Pad Location	
		X	Y			X	Y
1	VSSL	920	1080	14	VDDA	1780	101
2	VCORE	635	1080	15	RSTB	1900	101
3	N.C.	270	1080	16	VREF	2020	101
4	Rosc	102.4	840	17	N.C.	2293.6	108
5	N.C.	102.4	720	18	M3/MSEL1	2293.6	228
6	M0	102.4	600	19	M1	2293.6	348
7	M2/MSELO	102.4	480	20	/REC	2293.6	468
8	N.C.	102.4	360	21	MICG	2293.6	588
9	VSSP	102.4	240	22	VSSA	2210	775
10	VOUT1	310	101	23	VCM	2025	775
11	VOUT2	420	101	24	MIC+	1905	775
12	VDDL	530	101	25	MIC-	1785	775
13	VDDP	640	101				

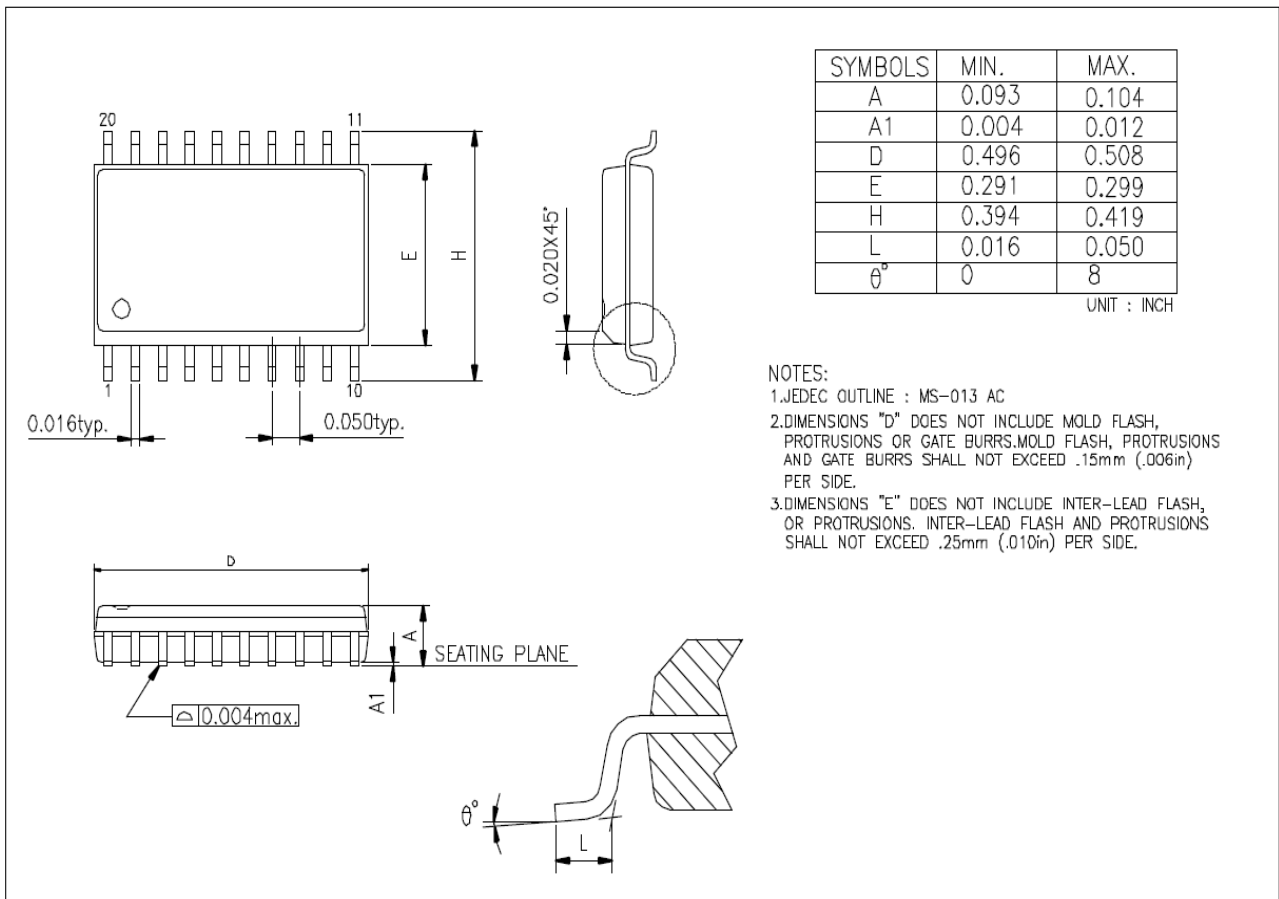
- Unit : [um]

PACKAGES DIMENSION OUTLINES

20-Pin 300mil DIP Package



20-Pin 300mil SOP Package



● **HISTORY**

Ver. A (2014/06/13) :

- Original version data sheet for aPR2060 H2.2.

Ver. B (2016/3/30) :

- The definition of page 7 message record & message playback.