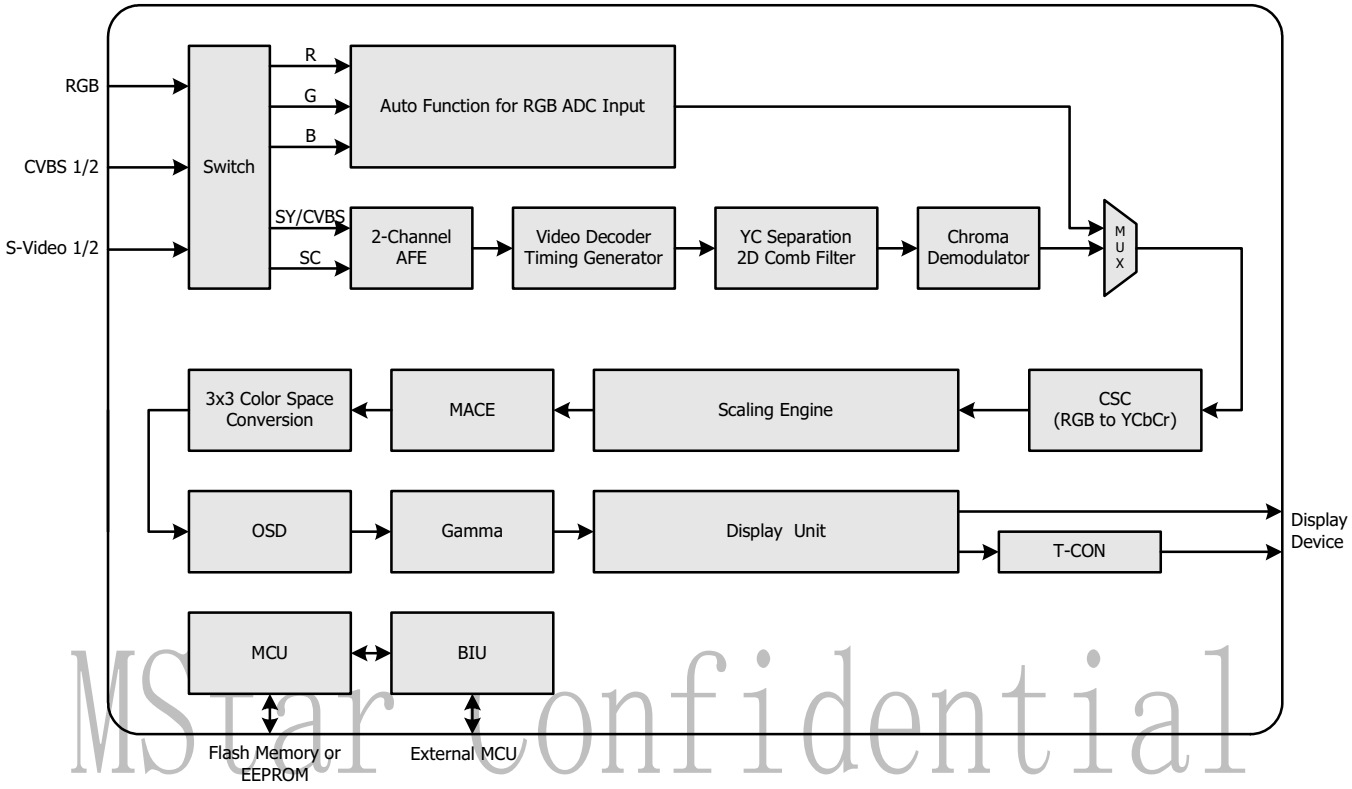
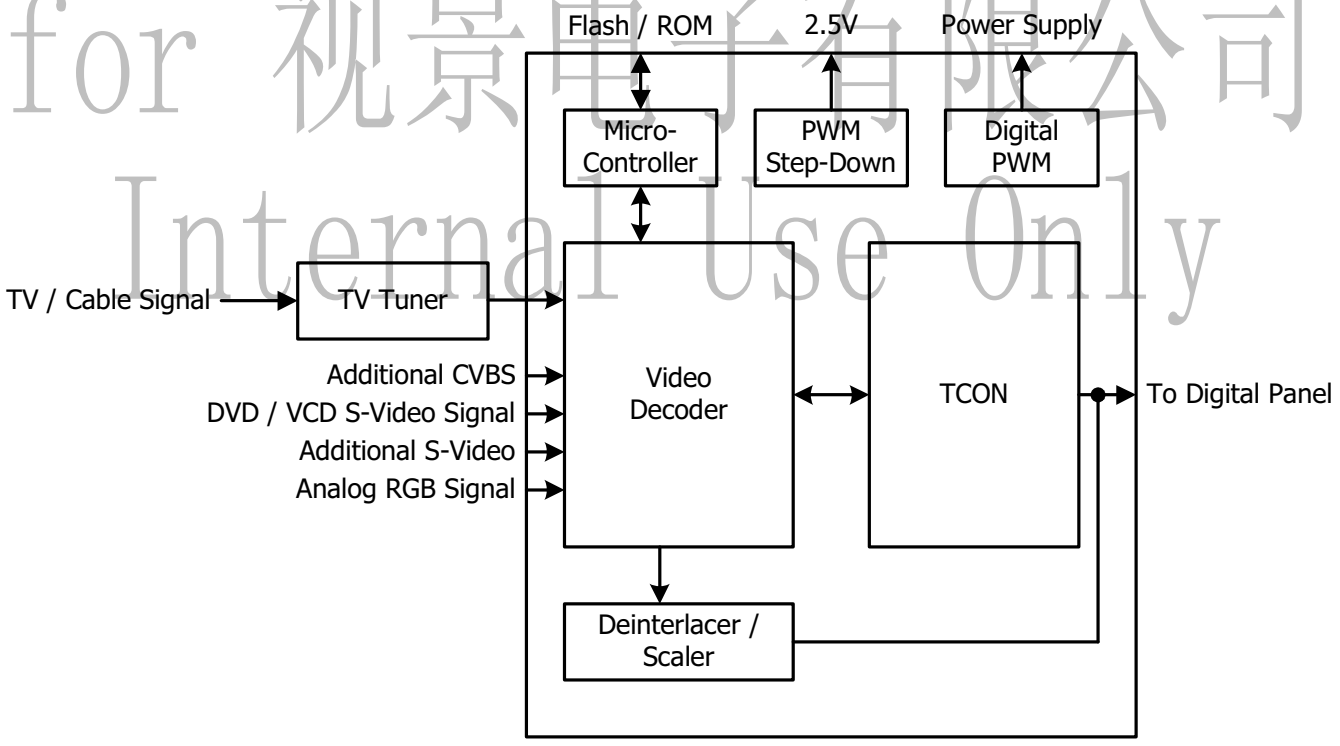
FEATURES

- Video Decoder
  - Supports NTSC, PAL and SECAM video input formats
  - 2D NTSC and PAL comb-filter for Y/C separation of CVBS input
  - Multiple CVBS and S-video inputs
  - Supports Closed-caption and V-chip
  - ACC, AGC, and DCGC (Digital Chroma Gain Control)
- Analog Input
  - Supports RGB input format from PC, camcorders and GPS
  - Supports video input 480i, 480p, 576i, 576p, 720p, 1080i; RGB input resolution in 640x480, 800x480, and 800x600 (SVGA)
  - 3-channel low-power 10-bit ADCs integration for RGB
  - Supports RGB composite sync input (CSYNC), SOG, HSYNC, and VSYNC
  - On-chip clock synthesizer and PLL
  - Auto-position adjustment, auto-phase adjustment, auto-gain adjustment, and auto-mode detection
- Color Engine
  - Brightness, contrast, saturation, and hue adjustment
  - 9-tap programmable multi-purpose FIR (Finite Impulse Response) filter
  - Differential 3-band peaking engine
  - Luminance Transient Improvement (LTI)
  - Chrominance Transient Improvement (CTI)
  - Black Level Extension (BLE)
  - White Level Extension (WLE)
  - Favor Color Compensation (FCC)
  - 3-channel gamma curve adjustment
- Scaling Engine/Panel Interface
  - Supports digital panels up to 1366x768
  - Supports single 8-bit TTL panel outputs
  - Supports various displaying modes
  - Supports horizontal panorama scaling
- Digital PWM Controller
  - Integrated general purpose digital PWM control loop
  - Programmable startup operating frequency and period with output voltage regulation
  - Programmable output current regulation; 40KHz~70KHz switching frequency, sync. to HSYNC possible
  - Burst-mode or continuous-mode for output current regulation; 150Hz~300Hz burst-mode frequency, sync. to VSYNC possible
  - Programmable protection level for input voltage and fault detection
- Miscellaneous
  - Built-in MCU
  - 3-wire serial bus interface for configuration setup
  - Built-in step-down PWM circuit for input 2.5V
  - Built-in VCOM DC level adjusting circuits
  - Built-in internal OSD with 256 programmable fonts, 16-color palettes, and 12-bit color resolution
  - Supports external OSD
  - Spread spectrum clocks
  - Optional 3.3V / 5V output pads with programmable driving current
  - 128-pin PQFP package

BLOCK DIAGRAM



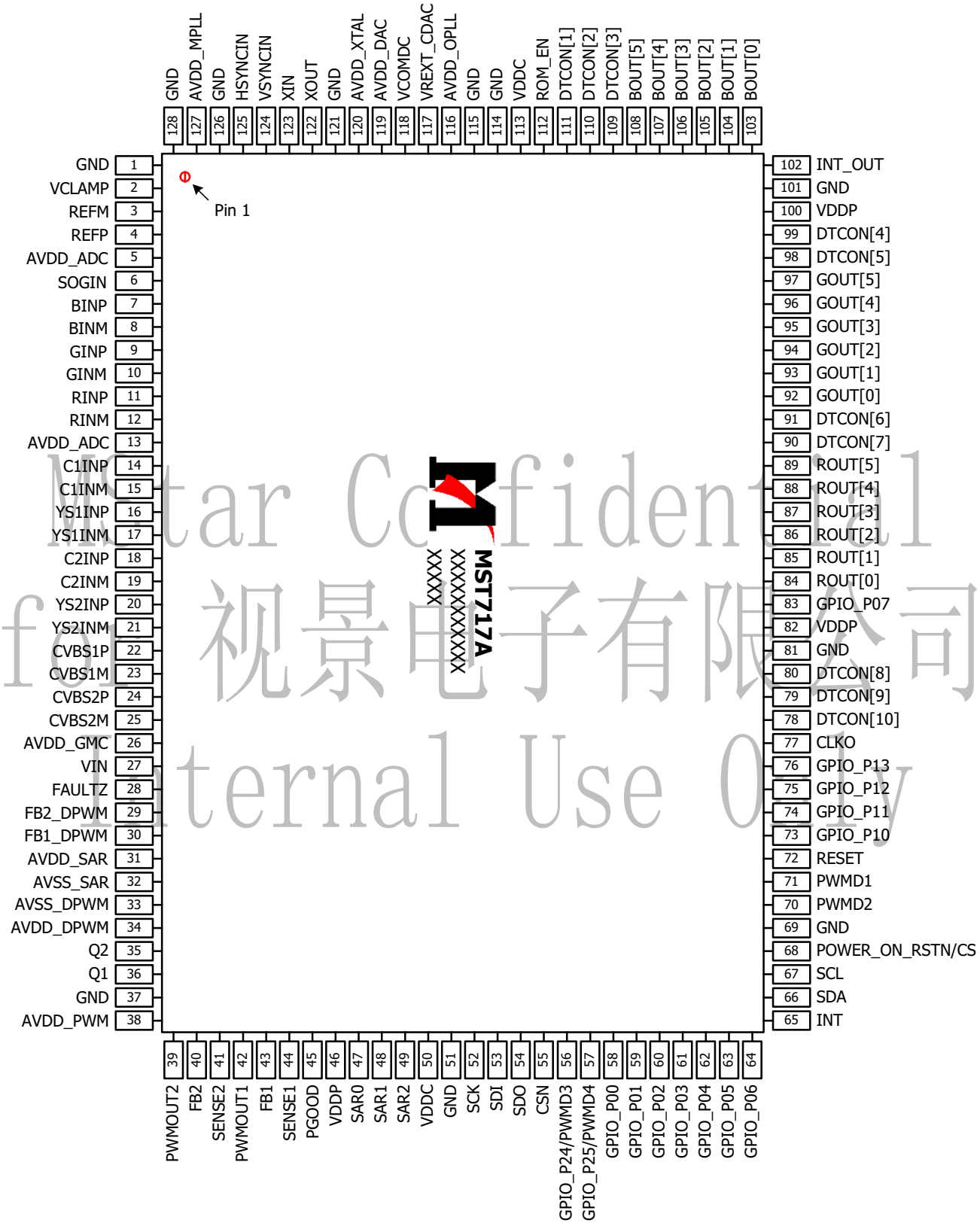
SYSTEM APPLICATION DIAGRAM



GENERAL DESCRIPTION

The MST717A is a high quality ASIC for NTSC/PAL/SECAM car TV application. It receives analog NTSC/PAL/SECAM CVBS and S-Video inputs from TV tuners, DVD or VCR sources, including weak and distorted signals, as well as analog RGB input from GPS systems. Automatic gain control (AGC) and 8-bit 3-channel A/D converters provide high resolution video quantization. With automatic video source and mode detection, users can easily switch and adjust variety of signal sources. Multiple internal adaptive PLLs precisely extract pixel clock from video source and perform sharp color demodulation. Built-in line-buffer supports adaptive 2-D comb-filter, 2-D sharpening, and synchronization stabler in a condense manner. The output format of MST717A supports 6-bit or 8-bit TTL digital TFT-LCD modules.

PIN DIAGRAM (MST717A)



PIN DESCRIPTION

Analog Interface

Pin Name	Pin Type	Function	Pin
VCLAMP		CVBS/YC Mode Clamp Voltage Bypass	2
REFM		Internal ADC Bottom De-coupling Pin	3
REFP		Internal ADC Top De-coupling Pin	4
SOGIN	Analog Input	Sync-on-Green slicer input	6
BINP	Analog Input	Analog B Input of VGA	7
BINM	Analog Input	Reference Ground for Analog B Input of VGA	8
GINP	Analog Input	Analog G Input of VGA	9
GINM	Analog Input	Reference Ground for Analog G Input of VGA	10
RINP	Analog Input	Analog R Input of VGA	11
RINM	Analog Input	Reference Ground for Analog R Input of VGA	12
C1INP	Analog Input	Analog Chroma Input for TV S-Video1 / Analog Composite Input of TV CVBS4	14
C1INM	Analog Input	Reference Ground for Analog Chroma Input of TV S-Video1 / Analog Composite Input of TV CVBS4	15
YS1INP	Analog Input	Analog Luma Input of TV S-Video1 / Analog Composite Input of TV CVBS3	16
YS1INM	Analog Input	Reference Ground for Analog Luma Input of TV S-Video1 / Analog Composite Input of TV CVBS3	17
C2INP	Analog Input	Analog Chroma Input for TV S-Video2	18
C2INM	Analog Input	Reference Ground for Analog Chroma Input of TV S-Video2	19
YS2INP	Analog Input	Analog Luma Input of TV S-Video2	20
YS2INM	Analog Input	Reference Ground for Analog Luma Input of TV S-Video2	21
CVBS1P	Analog Input	Analog Composite Input for TV CVBS1	22
CVBS1M	Analog Input	Reference Ground for Analog Composite Input of TV CVBS1	23
CVBS2P	Analog Input	Analog Composite Input for TV CVBS2	24
CVBS2M	Analog Input	Reference Ground for Analog Composite Input of TV CVBS2	25
VREXT_CDAC	Analog Input	Reference Current Generator, 820 ohm to Ground	117
HSYNCIN	Schmitt Trigger Input w/ 5V-tolerant	HSYNC / Composite Sync for VGA Input	125
VSYNCIN	Schmitt Trigger Input w/ 5V-tolerant	VSYNC for VGA Input	124

Digital Panel Output Interface

Pin Name	Pin Type	Function	Pin
CLKO	Output	Display Clock Output	77
ROUT[5:0]	Output	Red channel Output [5:0]	89-84
GOUT[5:0]	Output	Green channel Output [5:0]	97-92
BOUT[5:0]	Output	Blue channel Output [5:0]	108-103
DTCON[10:1]	Output	TCON Output	78-80, 90, 91, 98, 99, 109-111

VCOM Interface

Pin Name	Pin Type	Function	Pin
VCOMDC	Analog Output	Reference DC voltage output for common amplifier.	118

Switching Power and PWM Interface

Pin Name	Pin Type	Function	Pin
PWMOUT	Output	Switching Pulse Output for DC-DC Converter	39
FB2	Analog Input	Error Voltage Feedback Input Pin for PWM2; voltage = 1.2V	40
SENSE2	Analog Input	Sense Circuit Connection for PWM2	41
PWMOUT1	Output	Switching Pulse Output for DC-DC Converter	42
FB1	Analog Input	Error Voltage Feedback Input Pin for PWM1; voltage = 1.2V	43
SENSE1	Analog Input	Sense Circuit Connection for PWM1	44
PGOOD	Output	Power Good Indicator	45

Internal MCU Interface with Serial Flash Memory

Pin Name	Pin Type	Function	Pin
SAR2	Analog Input	SAR Low Speed ADC Input 2	49
SAR1	Analog Input	SAR Low Speed ADC Input 1	48
SAR0	Analog Input	SAR Low Speed ADC Input 0	47
SCK	Output	SPI Interface Sampling Clock	52
SDI	Output	SPI Interface Data-In	53
SDO	Input w/ 5V-tolerant	SPI Interface Data-Out	54
CSN	Output	SPI Interface Chip Select	55
GPIO_P00-GPIO_P06	I/O w/ 5V-tolerant	General Purpose Input/Output; 4mA driving	58-64

Pin Name	Pin Type	Function	Pin
		strength	
GPIO_P10-GPIO_P13	I/O w/ 5V-tolerant	General Purpose Input/Output; 4mA driving strength	73-76
INT	Input	Interrupt Input for IR Receiver	65
SDA	I/O w/ 5V-tolerant	3-Wire Serial Bus Data	66
SCL	Input w/ 5V-tolerant	3-Wire Serial Bus Clock	67
POWER_ON_RSTN/CS	Input w/ 5V-tolerant	Power On Reset Signal/Chip Selection for 3-wire Serial	68
GPIO_P07	I/O w/ 5V-tolerant	General Purpose Input/Output; 4mA driving strength	83

Digital PWM Interface

Pin Name	Pin Type	Function	Pin
Q1	Output	DPWM Output 1	36
Q2	Output	DPWM Output 2	35
FB1_DPWM	Analog Input	Input for 1st Feedback Loop	30
FB2_DPWM	Analog Input	Input for 2nd Feedback Loop	29
FAULTZ	Analog Input	Fault Detection (Low Enable)	28
VIN	Analog Input	System Input Voltage Detection	27

Misc. Interface

Pin Name	Pin Type	Function	Pin
RESET	Schmitt Trigger Input w/ 5V-tolerant	Hardware Reset; active high	72
XIN	Analog Input	Crystal Oscillator Input	123
XOUT	Analog Output	Crystal Oscillator Output	122
GPIO_P24/PWMD3	Output	General Purpose Input/Output; 4mA driving strength/ Pulse Width Modulation Output; 4mA driving strength	56
GPIO_P25/PWMD4	Output	General Purpose Input/Output; 4mA driving strength/ Pulse Width Modulation Output; 4mA driving strength	57
PWMD2	Output	Pulse Width Modulation Output; 4mA driving strength	70
PWMD1	Output	Pulse Width Modulation Output; 4mA driving strength	71
INT_OUT	Output	Mode Detection Interrupt Output	102
ROM_EN	Input	Internal ROM Enable. 0: Disable. 1: Enable.	112

Power Pins

Pin Name	Pin Type	Function	Pin
AVDD_ADC	2.5V Power	ADC Power	5, 13
AVDD_GMC	5V Power	GMC Power	26
AVDD_SAR	5V Power	SAR Power	31
AVDD_DPWM	5V Power	DPWM Power	34
AVDD_PWM	5V Power	PWM Power	38
AVDD_OPLL	2.5V Power	OPLL Power	116
AVDD_DAC	5V Power	Voltage DAC Power	119
AVDD_XTAL	5V Power	XTAL Power	120
AVDD_MPLL	2.5V Power	MPLL Power	127
VDDC	2.5V Power	Digital Core Power	50, 113
VDDP	3.3V/5V Power	Digital Input/Output Power	46, 82, 100
AVSS_SAR	Ground	SAR Ground	32
AVSS_DPWM	Ground	DPWM Ground	33
GND	Ground	Ground	1, 37, 51, 69, 81, 101, 114, 115, 121, 126, 128

ELECTRICAL SPECIFICATIONS

Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Units
5.0V Supply Voltages	V_{VDD_50}	-0.3		5.5	V
3.3V Supply Voltages	V_{VDD_33}	-0.3		3.6	V
2.5V Supply Voltages	V_{VDD_25}	-0.3		2.75	V
Input Voltage (5V tolerant inputs)	$V_{IN5Vtol}$	-0.3		5.0	V
Input Voltage (non 5V tolerant inputs)	V_{IN}	-0.3		V_{VDD_33}	V
Ambient Operating Temperature (commercial use)	T_A	0		70	°C
Ambient Operating Temperature (extended temp. range)	T_A	-20		80	°C
Storage Temperature	T_{STG}	-40		125	°C
Junction Temperature	T_J			125	°C
Thermal Resistance (Junction to Air) Natural Conversion	θ_{JA}		TBD		°C/W
Thermal Resistance (Junction to Case) Natural Conversion	θ_{JC}		TBD		°C/W

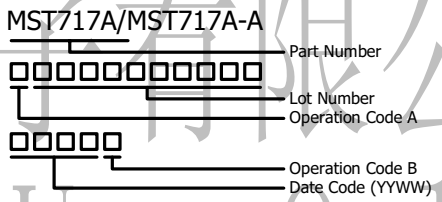
Note: Stress above those listed under Absolute Maximum Rating may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions outside of those indicated in the operation sections of this specification is not implied. Exposure to absolute maximum ratings for extended periods may affect device reliability.

ORDERING GUIDE

Model	Temperature Range	Package Description	Package Option
MST717A	0°C to +70°C	PQFP	128
MST717A-A	-20°C to +80°C	PQFP	128
MST717A-LF	0°C to +70°C	PQFP	128
MST717A-A-LF	-20°C to +80°C	PQFP	128

Note: Product suffix "-LF" represents lead-free version and "-A" represents extended temperature range.

MARKING INFORMATION



DISCLAIMER

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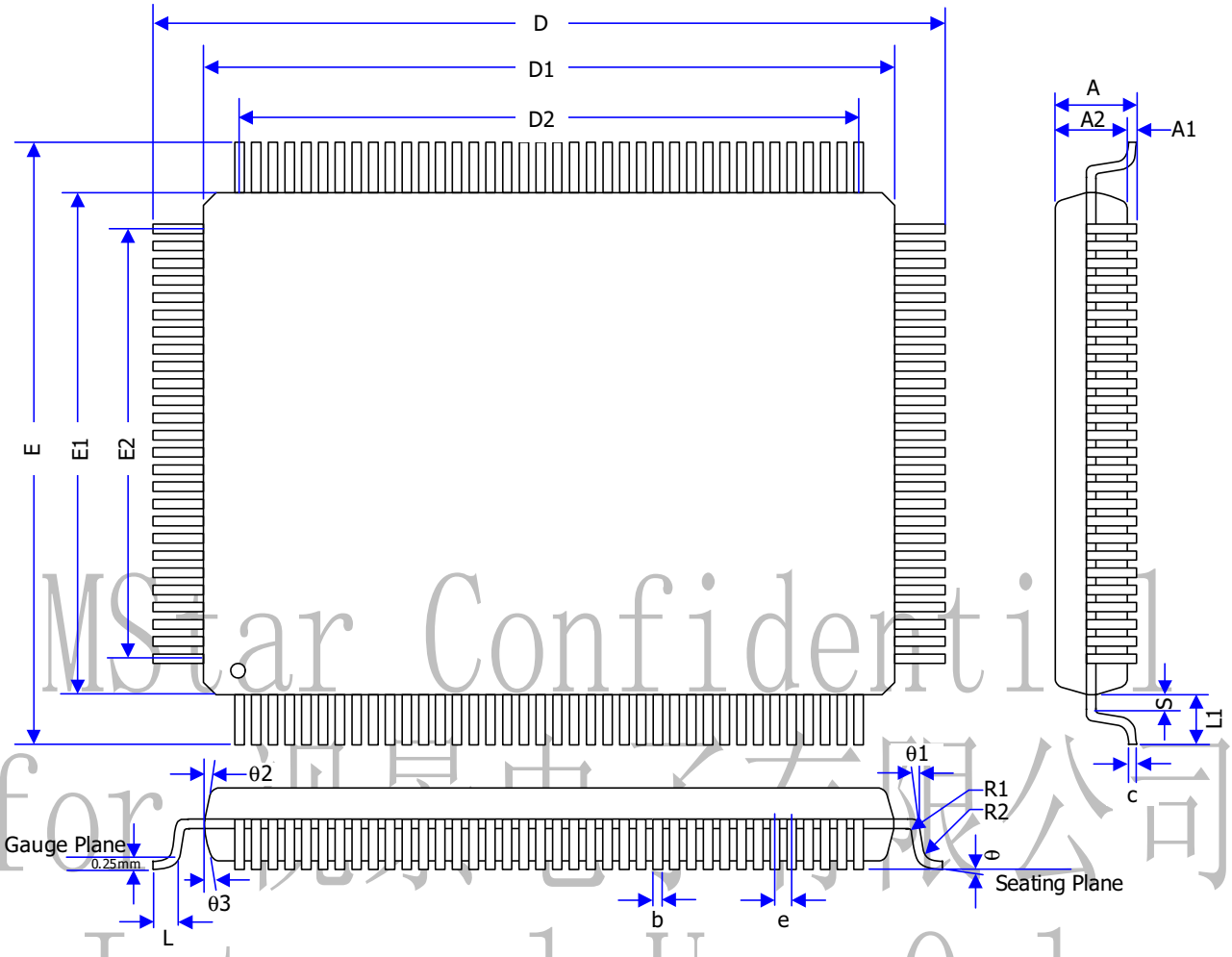
Electrostatic charges accumulate on both test equipment and human body and can discharge without detection. MST717A comes with ESD protection circuitry; however, the device may be permanently damaged when subjected to high energy discharges. The device should be handled with proper ESD precautions to prevent malfunction and performance degradation.

REVISION HISTORY

Document	Description	Date
MST717A_ds_v01	• Initial release	Dec 2005

MECHANICAL DIMENSIONS



Symbol	Millimeter			Inch		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	-	-	3.40	-	-	0.134
A1	0.25	-	-	0.010	-	-
A2	2.50	2.72	2.90	0.098	0.107	0.114
D	23.20			0.913		
D1	20.00			0.787		
D2	18.50			0.728		
E	17.20			0.677		
E1	14.00			0.551		
E2	12.50			0.492		
R1	0.13	-	-	0.005	-	-
R2	0.13	-	0.30	0.005	-	0.012

Symbol	Millimeter			Inch		
	Min.	Nom.	Max.	Min.	Nom.	Max.
θ	0°	-	7°	0°	-	7°
θ1	0°	-	-	0°	-	-
θ2, θ3 (Alloy)	7° Ref			7° Ref		
θ2, θ3 (Copper)	15° Ref			15° Ref		
b	0.170	0.200	0.270	0.007	0.008	0.011
c	0.11	0.15	0.23	0.004	0.006	0.009
e	0.50 BSC.			0.020 BSC.		
L	0.73	0.88	1.03	0.029	0.035	0.041
L1	1.60 Ref			0.063 Ref		
S	0.20	-	-	0.008	-	-