OTi-2158 Data Sheet

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OTi–2158 Data Sheet
USB 2.0 to SD/MMC Bridge Controller

APPROVED SHEET

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■ **OVERVIEW**

The OTi-2158 is a cost-effective, high-performance controller device bridging USB (Universal Serial Bus) and SD (Secure Digital) / MMC (Multimedia Card) Flash cards. It complies with USB rev.2.0, MMC specification rev.4.1, and SD card specification rev 1.1.

The OTi-2158 uses 12MHz crystal and slew-rate controlled pads to reduce the EMI issue. With OTI's SOC design expertise, this device can provide you with optimal and reliable data throughput between USB and SD/MMC interfaces.

This controller works on Windows XP, Windows 2000, Windows ME, and Mac OS without the need of installing driver. It is available in 48-pin LQFP and LQFN package to facilitate low-cost and compact PCB design.

■ **FEATURES**

♦ Complies with High-Speed USB 2.0 with built-in high/full-speed transceiver and SIE

♦ Complies with MMC specification rev.4.1 and SD specification rev 1.1

♦ Complies with USB Storage Class specification ver.1.0. (Bulk only protocol)

♦ Supports 4 endpoints: Control (0) / Bulk Read (1) / Bulk Write (2) / Interrupt (3).

♦ 64 / 512 bytes Data Payload for full / high speed Bulk Endpoint

♦ Supports power down mode and USB suspend with wakeup capability

♦ Configurable Vendor ID / Product ID (VID/PID)

♦ 12MHz external clock to provide better EMI 3.3V power input

♦ 48-pin of LQFP and LQFN is available

♦ Supports operating system: Windows XP/ 2000/ ME, Linux 2.4 above, Mac OS 9 & higher

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■ BLOCK DIAGARAM

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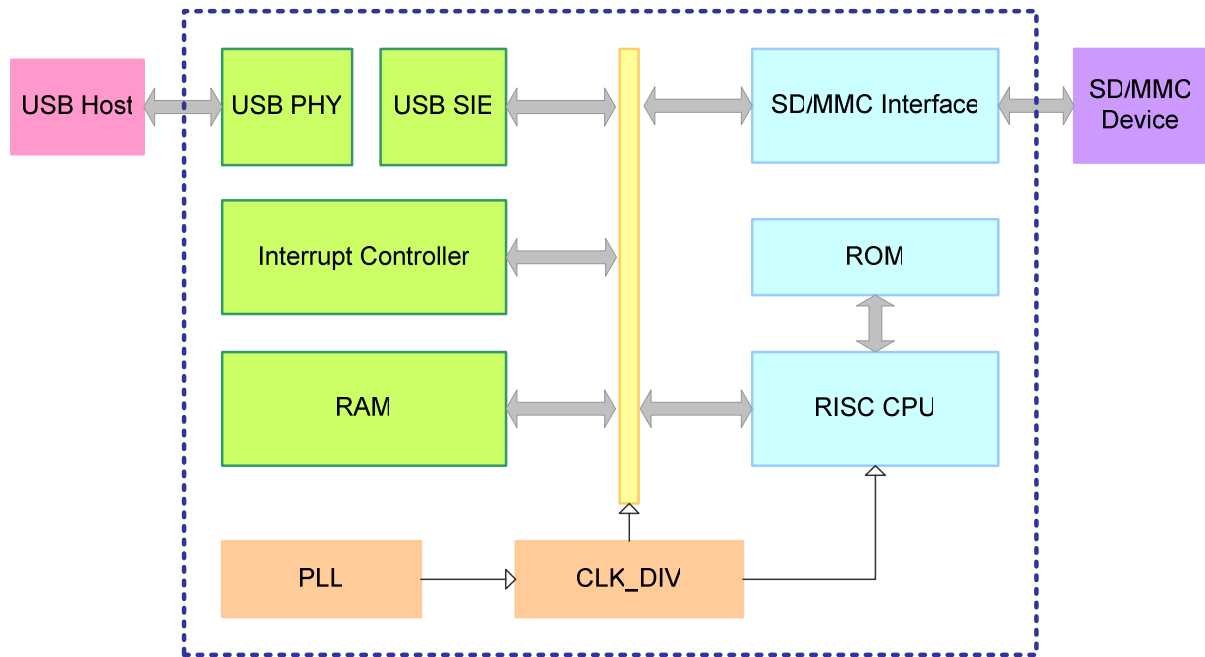
■ **PIN CONFIGURATION**

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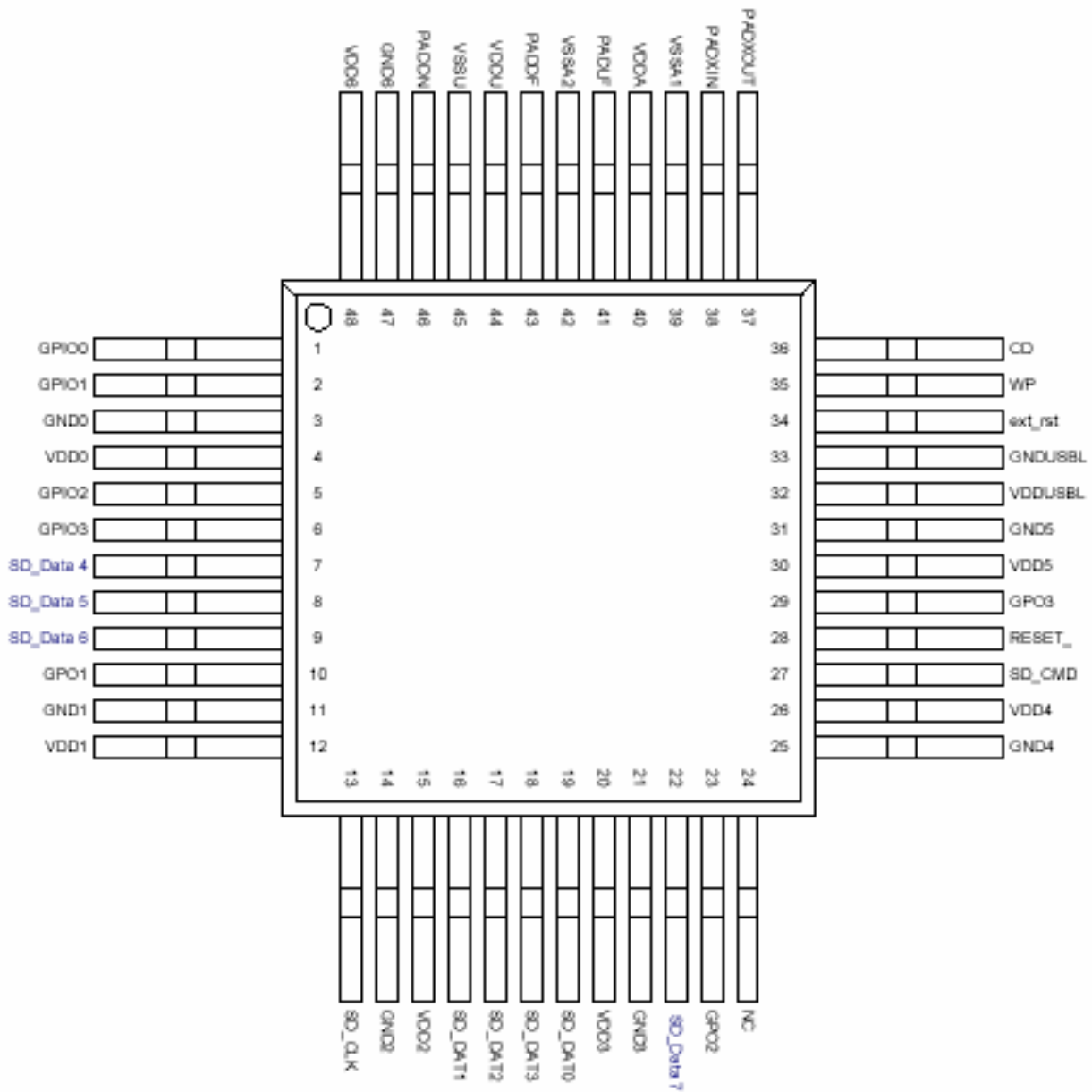
■ **PIN DESCRIPTION**

OTi-2158 with 48-pin package only provides fundamental USB to SD/MMC bridge function.

Pin #	Pin Name	Attribute	Description	Pin Status at Power On	Pin Status at Suspend
1	GPIO0	I/O	General purpose input/output 0	High Impedance -> output	High Impedance
2	GPIO1	I/O	General purpose input/output 1	High Impedance -> output	High Impedance
3	GND0	P	Logic ground 0	NA	NA
4	VDD0	P	Logic power 0	NA	NA
5	GPIO2	I/O	General purpose input/output 2	High Impedance -> output	High Impedance
6	GPIO3	I/O	General purpose input/output 3	High Impedance -> output	High Impedance
7	SD_Data 4	I/O	HSMMC Data 4	High Impedance	High Impedance
8	SD_Data 5	I/O	HSMMC Data 5	High Impedance	High Impedance
9	SD_Data 6	I/O	HSMMC Data 6	High Impedance	High Impedance
10	GPO1	I/O	General purpose output 1	High Impedance -> output	High Impedance
11	GND1	P	Logic ground 1	NA	NA
12	VDD1	P	Logic power 1	NA	NA
13	SD_CLK	O	SD/MMC CLK	output	output
14	GND2	P	Logic ground 2	NA	NA
15	VDD2	P	Logic power 2	NA	NA
16	SD_DAT1	I/O	SD Data 1	High Impedance	High Impedance
17	SD_DAT2	I/O	SD Data 2	High Impedance	High Impedance
18	SD_DAT3	I/O	SD Data 3/MMC CS	High Impedance	High Impedance
19	SD_DAT0	I/O	SD/MMC Data 0	High Impedance	High Impedance
20	VDD3	P	Logic power 3	NA	NA
21	GND3	P	Logic ground 3	NA	NA
22	SD_Data 7	I/O	HSMMC Data 7	High Impedance	High Impedance
23	GPO2	I/O	General purpose output 2	High Impedance -> output	High Impedance
24	NC		NC		
25	GND4	P	Logic ground 4	NA	NA

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26	VDD4	P	Logic power 4	NA	NA
27	SD_CMD	I/O	SD/MMC CMD	High Impedance	High Impedance
28	RESET_	I	External Power On Reset input	Input	Input
29	GPO3	I/O	General purpose output 3	output	High Impedance
30	VDD5	P	Logic power 5	NA	NA
31	GND5	P	Logic ground 5	NA	NA
32	VDDUSBL	P	USB logic 3.3v power	NA	NA
33	GNDUSBL	P	USB logic ground	NA	NA
34	ext_rst	I	Select External POR	Input	Input
35	WP	I	Write Protection	Input	Input
36	CD	I	Card Detection	Input	Input
37	PADXOUT	O	Crystal output	NA	NA
38	PADXIN	I	Crystal input (12MHz)	NA	NA
39	VSSA1	P	Analog ground 1	NA	NA
40	VDDA	P	Analog power	NA	NA
41	PADLF	I/O	Reserved	NA	NA
42	VSSA2	P	Analog ground 2	NA	NA
43	PADDP	I/O	USB D+	NA	NA
44	VDDU	P	Analog power	NA	NA
45	VSSU	P	Analog ground	NA	NA
46	PADDN	I/O	USB D-	NA	NA
47	GND6	P	Logic ground 6	NA	NA
48	VDD6	P	Logic power 6	NA	NA

■ D.C. CHARACTERS

DC Characteristics-1 (Ta=-40°C to +85°C, Vcc = 3.3V ±10%)

Parameter	Symbol	MIN	TYP	MAX	Unit
Power Supply	VDD	2.7	3.3	3.6	V
Input Voltage	VIH	0.9xVDD	--	5	V
	VIL	-0.3	--	0.5xVDD	V
Output Voltage	VOH	VDD-0.4	--	--	V
	VOL	--	--	0.4	V
Input leakage current	ILK	-1	--	1	μA
Working Current	IRW	--		--	mA
Operating Temperature	Ta	-40		85	°C
Storage Temperature	Ts	-55		+150	°C
IO output current	IOH	--	4	--	mA
	IOL	--	4	--	mA

■ A.C. CHARACTERS

Parameter	Symbol	MIN	TYP	MAX	Unit
Input rising delay	TPIlh	0.35(2PF)	0.4(4PF)	0.54(8PF)	ns
Input falling delay	TPIhl	0.46(2PF)	0.53(4PF)	0.64(8PF)	ns
Output rising delay	TPOlh	1.35(10PF)	2.41(30PF)	2.59(50PF)	ns
Output falling delay	TPOhl	1.61(10PF)	2.41(30PF)	3.21(50PF)	ns

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■ FUNCTION DESCRIPTION

Secure Digital and Multimedia Memory Card

The OTi-2158 complies with Secure Digital (SD) card specification rev.1.1 and Multimedia card specification rev.4.1. Please refer to the SD and MMC specifications for more information.

USB 2.0

The OTi-2158 integrates USB 2.0 transceiver as well as SIE in single chip and complies with USB 2.0 specifications. Please refer to the USB 2.0 specifications for more information.
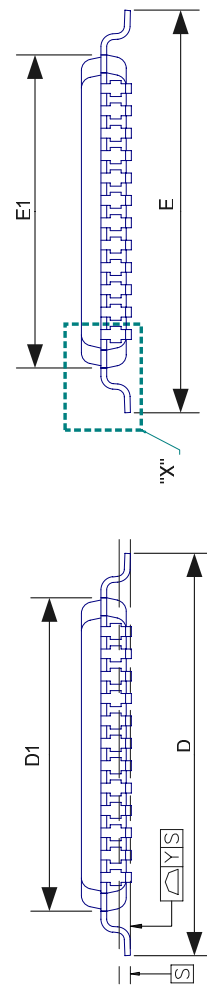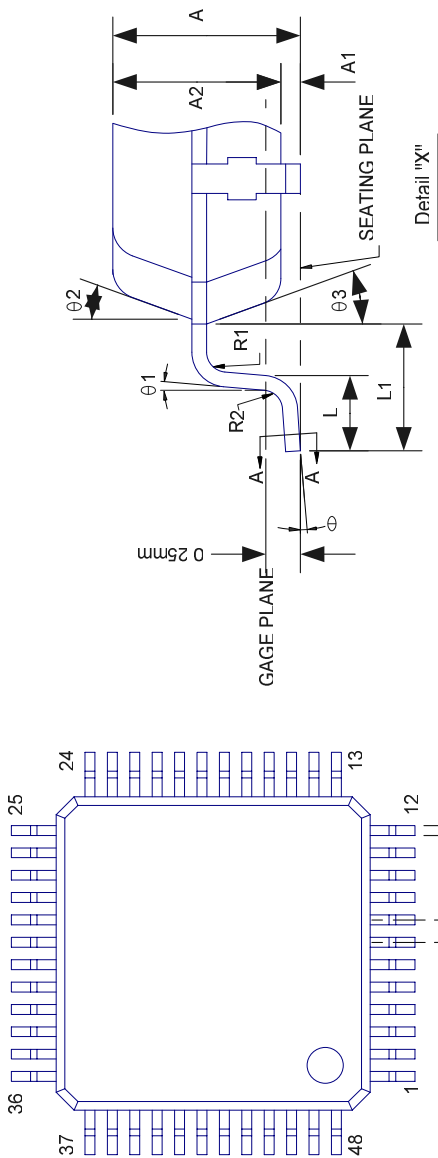
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■ APPLICATION CIRCUIT
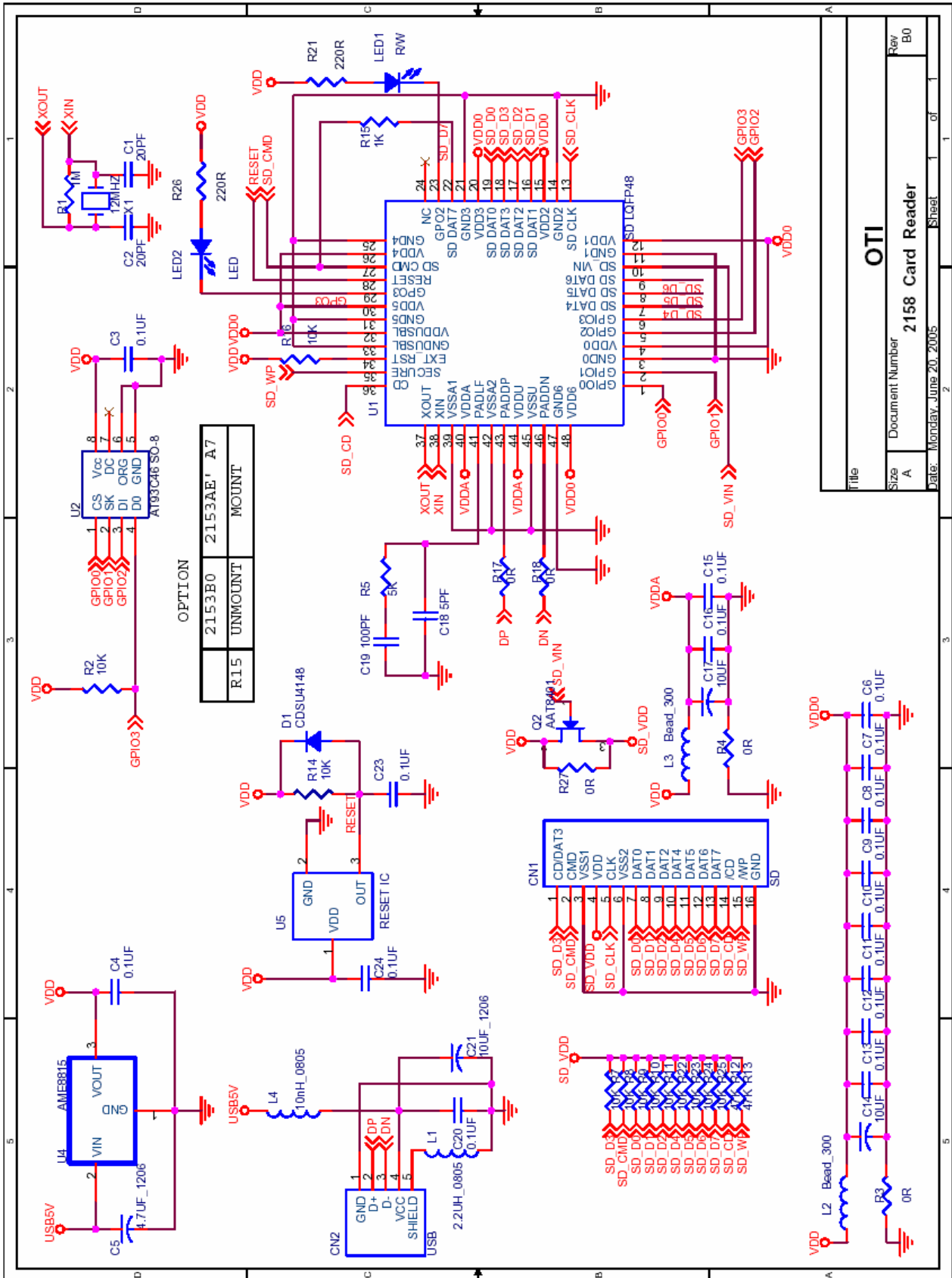
■ PACKAGE DIMENSION

SYMBOL	DIMENSION (MM)		
	MIN	NOM	MAX
A		1.40	1.60
A1	0.05		0.15
A2	1.35	1.40	1.45
b	0.17	0.22	0.27
b1	0.17	0.20	0.23
c	0.09		0.20
c1	0.09		0.16
D		9.00 BSC	
D1		7.00 BSC	
E		9.00 BSC	
E1		7.00 BSC	
e		0.50 BSC	
L	0.45	0.60	0.75
L1		1.00 REF	
R1	0.08		0.20
R2	0.08		0.075
Y			7°
θ	0°	3.5°	7°
θ1	0°		
θ2	11°	12°	13°
θ3	11°	12°	13°

NOTE:
1. REFER TO JEDEC MS-026.
2. DIMENSION D1 AND E1 DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25mm PER SIDE D1 AND E1 ARE MAXIMUM PLASTIC BODY SIZE DIMENSION INCLUDING MOLD MISMATCH.
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL NOT CAUSE THE LEAD WIDTH TO EXCEED THE MAXIMUM b DIMENSION BY MORE THAN 0.08mm.
4. ALL DIMENSIONS IN MILLIMETERS.

TITLE: LQFP48 (7x7x1.4mm)

PROJ.

SEATING PLANE

Detail "X"

GAGE PLANE

0.25mm

"X"

BASE METAL

WITH PLATING

SECTION A-A

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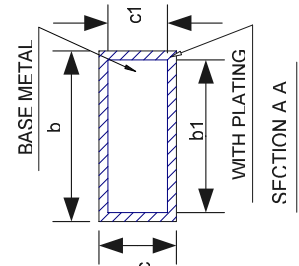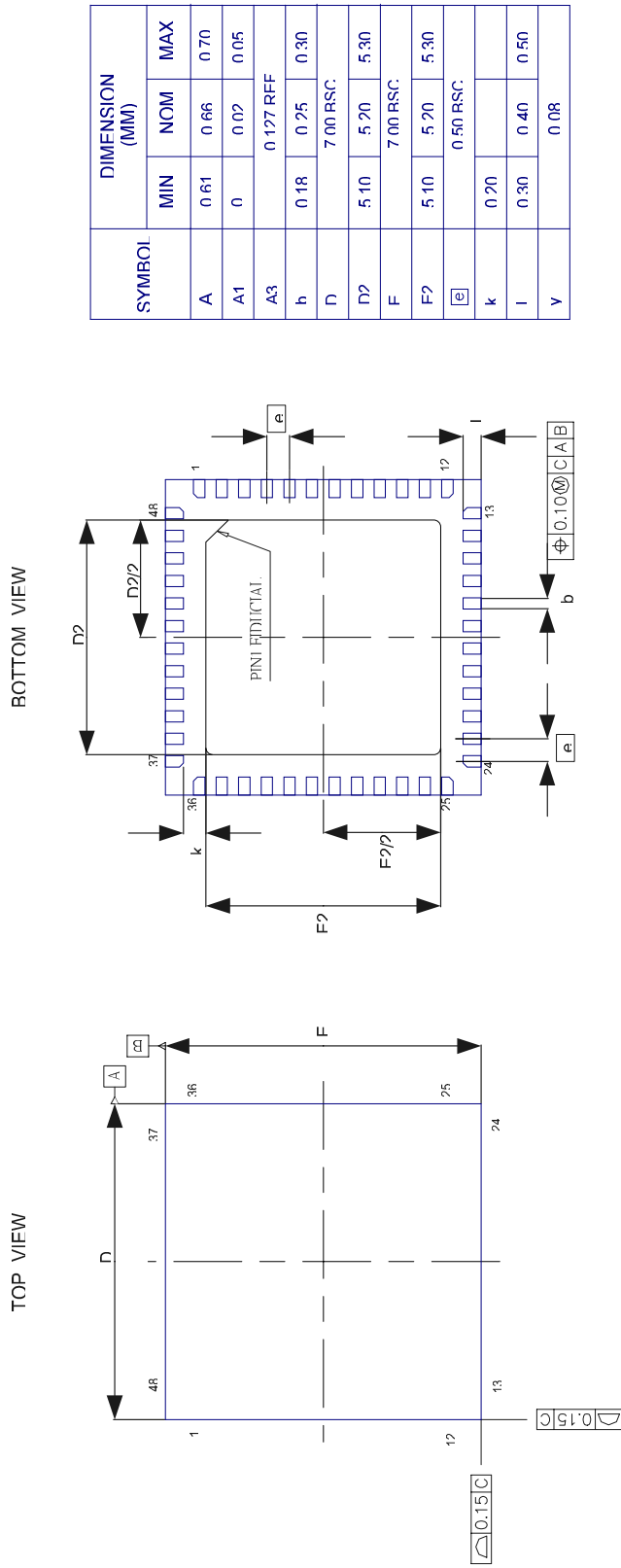
SYMBOL	DIMENSION (MM)		
	MIN	NOM	MAX
A	0.61	0.66	0.70
A1	0	0.02	0.05
A3		0.127 REF	
b	0.18	0.25	0.30
D	5.10	7.00 BSC	5.30
D2	5.10	5.20	5.30
E		7.00 BSC	
E2	5.10	5.20	5.30
e		0.50 BSC	
k	0.20		
L	0.30	0.40	0.50
y		0.08	

BOTTOM VIEW

PIN1 FIDUCIAL

TOP VIEW

NOTE:
1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5M-1994
2. REFER TO JEDEC STD MO-220 WKKD-2
3. DIMENSION "b" APPLINES TO METALLIZED TERMINAL AND IS
   MEASURED BETWEEN 0.25 AND 0.30mm FROM TERMINAL TIP
4. LEADFRAME MATERIAL IS OLIN194 AND THICKNESS IS 0.127mm (5 Mil)

SEATING PLANE

TITLE
LQFN48 (7x7x0.66mm)

PROJ

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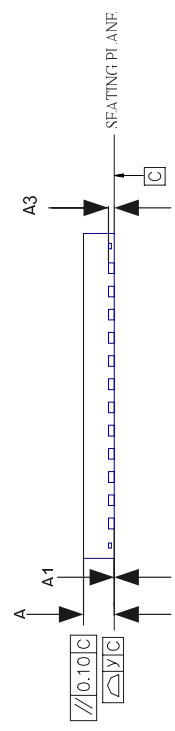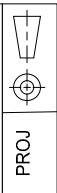
■ **MARKING INFORMATION**

LINE A <u>OTI002158</u>
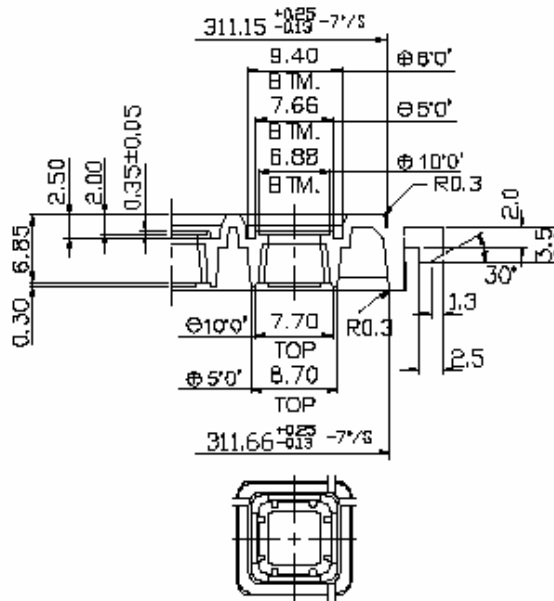
Product code

LINE B X X X X X X X X X X X X X X X

Date code: yww
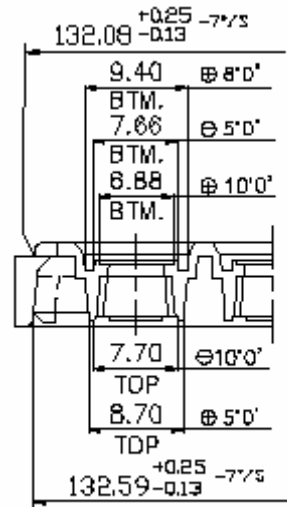
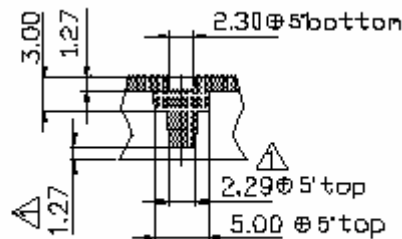Second version code

First version code

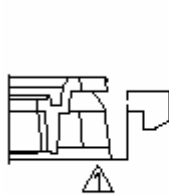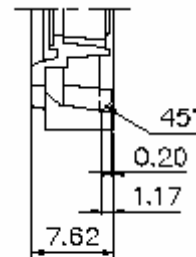■ **PACKING INFORMATION**

LQFP48
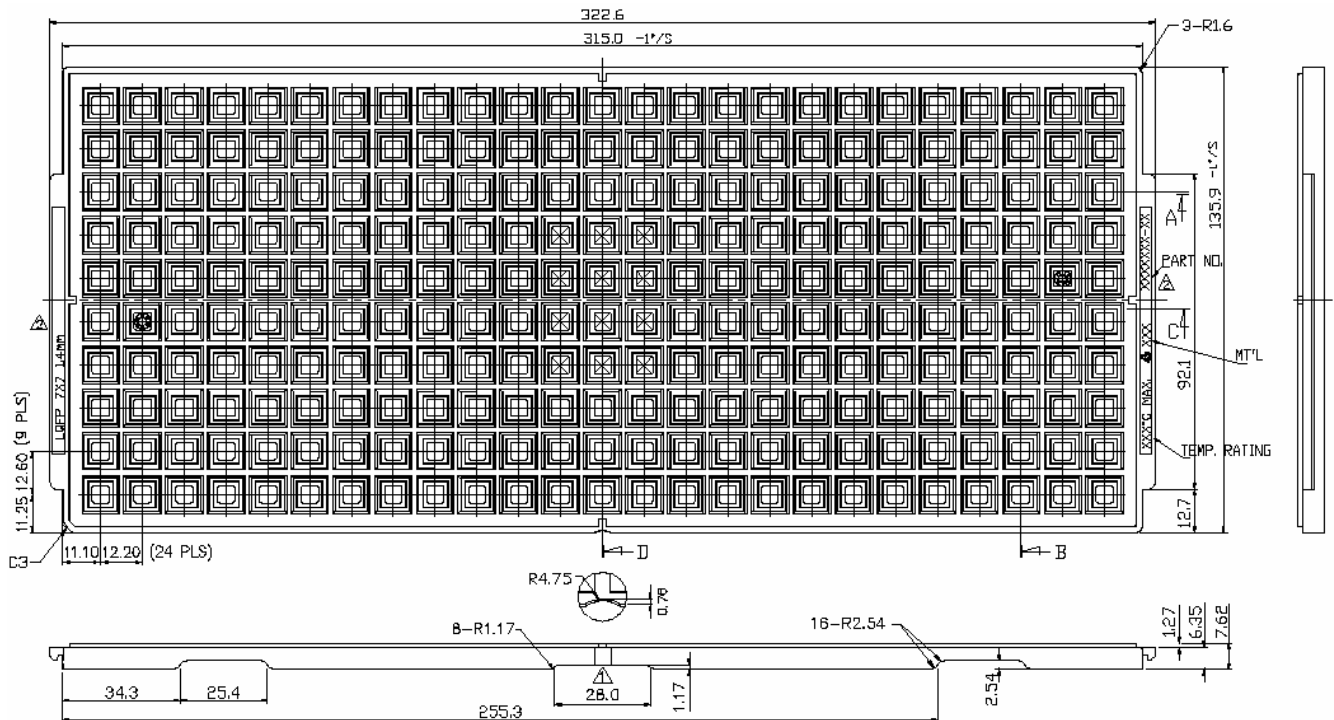
SECTION A (2/1)

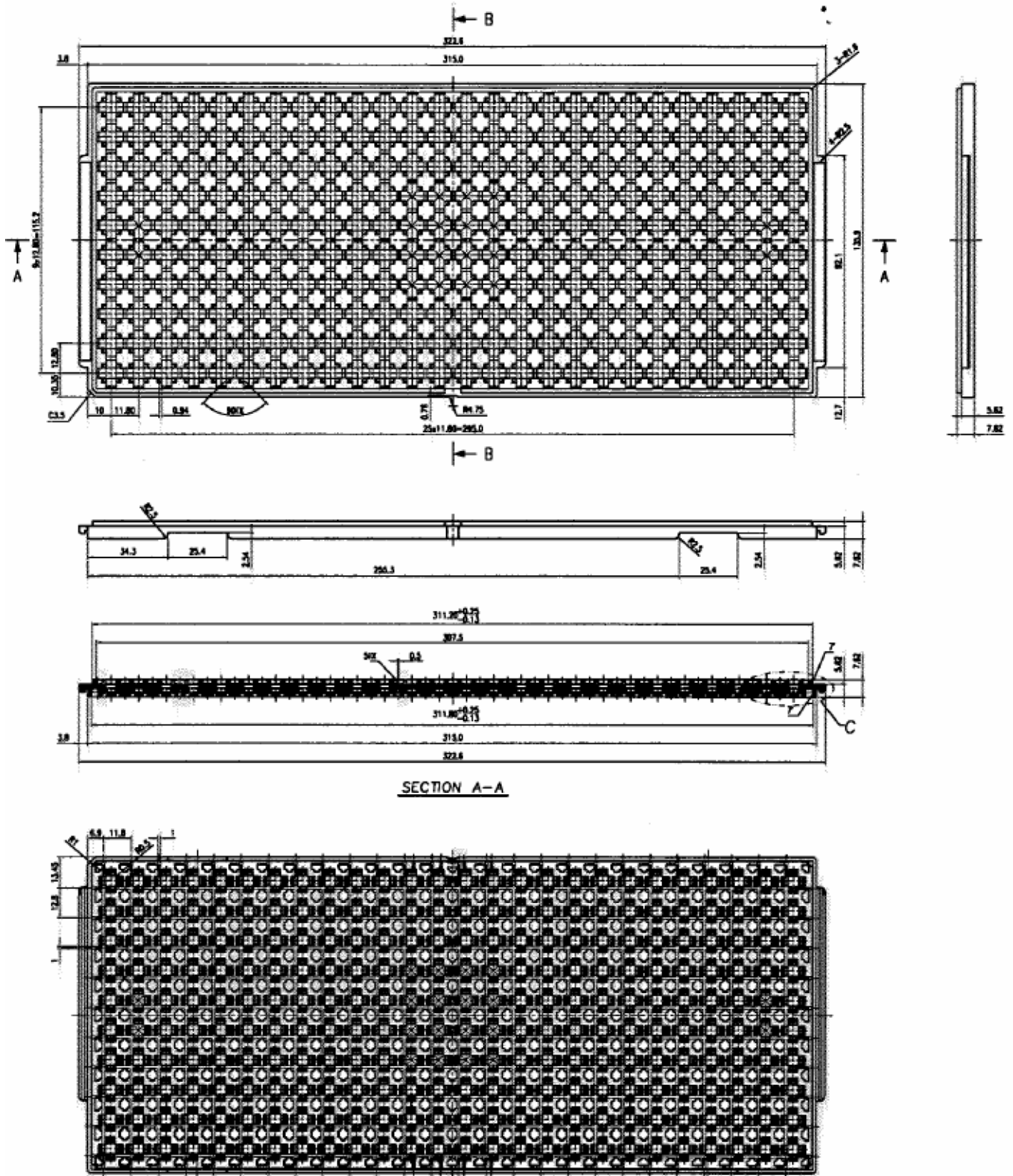SECTION B (2/1)

SECTION C(2/1)

SECTION D (2/1)

NOTES :

[1] (S.R. OHM/SQ.) MEANS SURFACE ELECTRIC RESISTIVITY OF THE TRAY.

2. THE MOLDED TRAY'S MATERIAL SHALL BE RIGID ENOUGH TO AVOID DAMAGE TO THE COMPONENTS DURING HANDILNG,LOADING,BACKING,TESTING, SHIPPING AND PLACING.

[3] TEMP.°C IS THE MAXIMUM OPERATING TEMPERATURE THE EMPTY TRAY CAN BE SUBJECTED TO FOR 48 CONTINOUS HOURS BAKING WITHOUT VIOLATING THE DIMENSIONAL TOLERANCE OF THE TRAY.

4. TRAYS ARE STACKABLE WITHOUT INTERFERENCE AND WILL NOT STICK TOGETHER DURING UNSTACKING OPERATION.

5. WARPAGE IS WITHIN 0.76 mm.

6. THE CELLS MARKED WITH CROSS SYMBOL ARE FOR VACCUM PICKUP AREA.

7. TOTAL USABLE CELLS 10X25=250.

8. THE TRAY MEETS JEDEC STANDARD.

LQFN-48

SECTION A-A

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SECTION B-B

DETAIL D

DETAIL C

NOTE :
1. HEAT RESISTANCE UP TO 24 HOURS 150°C.
2. SURFACE ELECTRIC RESISTIVITY LESS THAN $10^{12}\Omega$/sq
3. WARPAGE IS WITHIN 0.76mm.
4. TOLERANCE : X=±0.5mm
        X.X=±0.25mm
        X.XX=±0.13mm