DESCRIPTION

PT2225 is a remote control receiver utilizing the high performance CMOS Technology specially designed for use on various infrared remote control applications. It can be paired with PT2221/2 or NEC's µpD6121/2 to construct a very powerful remote control system. Housed in an 18-pin SO Package, PT2225 is capable of controlling a maximum of 64 functions and supports two custom code options.

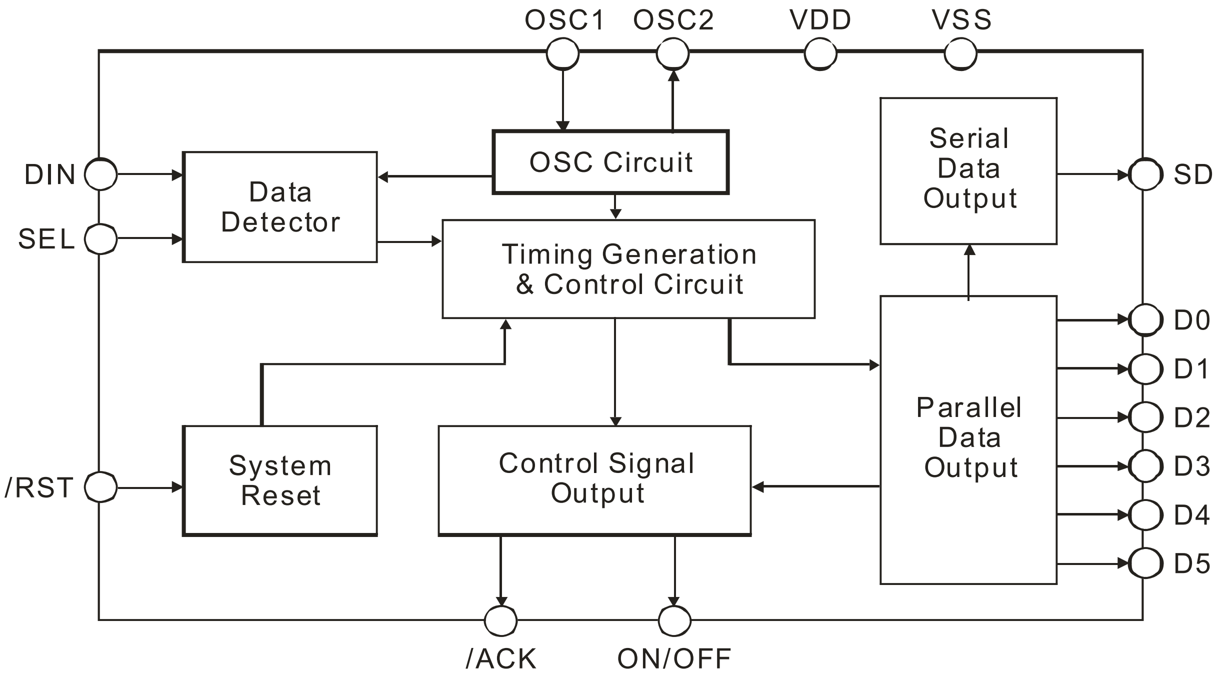
FEATURES

- CMOS Technology
- Low Power Consumption
- Very High Noise Immunity
- Code Detection Circuit Prevents Interference from Various Types of Machines and Apparatus.
- Two Custom Codes Available (FC08 and 866B)
- Serial and Parallel Outputs Available. (Serial Output may be used on RS-232, 9600 Baud Rate)
- Maximum of 64 Function Keys

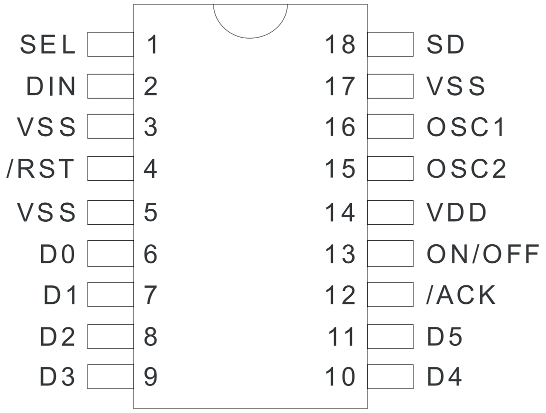
APPLICATIONS

- Cable TV Tuner
- Video Cassette Recorder
- Electrical Home Appliance
- Multi-Media Personal Computer System
- CD-ROM
- MPEG
- Presentation Software

BLOCK DIAGRAM


OSC1
OSC2
VDD
VSS
DIN
SEL
/RST
Data Detector
OSC Circuit
Timing Generation & Control Circuit
Serial Data Output
SD
Parallel Data Output
D0
D1
D2
D3
D4
D5
System Reset
Control Signal Output
/ACK
ON/OFF

PIN CONFIGURATION


SEL 1
DIN 2
VSS 3
/RST 4
VSS 5
D0 6
D1 7
D2 8
D3 9
18 SD
17 VSS
16 OSC1
15 OSC2
14 VDD
13 ON/OFF
12 /ACK
11 D5
10 D4

PT2225

PIN DESCRIPTION

Pin Name	I/O	Description	Pin No.
SEL	I	Customer Code Selector	1
DIN	I	Remote Signal Input	2
VSS	-	Negative Power Supply	3, 5, 17
/RST	I	Reset Pin When this pin is set to “L” Level, PT2225 is initialized.	4
D0~D5	O	Parallel Data Output Pin	6~11
/ACK	O	Acknowledge Signal	12
ON/OFF	O	Power Signal	13
VDD	-	Positive Power Supply	14
OSC2	O	Oscillator Output Pin	15
OSC1	I	Oscillator Input Pin	16
SD	O	Serial Data Output Pin	18

FUNCTION DESCRIPTION

PT2225 can receive signals transmitted by PT2221/2 (Transmitter) via the PT2225's Remote Signal Input Pin (DIN). This PT2221/2 transmission signal consists of a Leader Code, Custom Code and Data Code. The inverse code of the custom and data codes are also sent simultaneously; thereby, allowing extremely low error rate in the system configuration. Please refer to the diagram below: (For more information, see PT2221/2 Product Specification.)

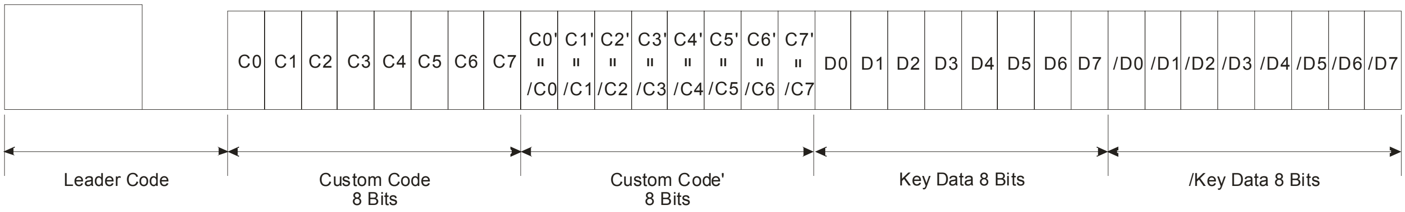

C0
C1
C2
C3
C4
C5
C6
C7
C0' = /C0
C1' = /C1
C2' = /C2
C3' = /C3
C4' = /C4
C5' = /C5
C6' = /C6
C7' = /C7
D0
D1
D2
D3
D4
D5
D6
D7
/D0
/D1
/D2
/D3
/D4
/D5
/D6
/D7
Leader Code
Custom Code 8 Bits
Custom Code' 8 Bits
Key Data 8 Bits
/Key Data 8 Bits

Figure 1. PT2221 Transmission Code Format

LEADER CODE

The Leader Code consist of a 9ms carrier waveform followed by a 4.5ms OFF waveform. It is used as to signal data transmission. Please refer to the Figure 1.

CUSTOM CODE

8 bits of Custom Code together with their 8 bits inversed custom codes are sent simultaneously by PT2221/2 to PT2225. Please refer to the Figure 1.
PTC provides 2 standard custom codes options as well as Customers can specify their own custom code definitions.

DATA CODE

8 bits of data codes together with their 8 bits inversed data codes are sent simultaneously by PT2221/2 to PT2225. Please refer to the Figure 1.

PT2225 OUTPUT PINS

PARALLEL DATA OUTPUT PINS: D0~D5

Output Pins - D0~D5 are parallel data output pins. When PT2225 receives a valid transmission, D0~D5 will send Parallel Latch Data Output. This data is sustained until another data is inputted or entered.

SERIAL DATA OUTPUT PIN: SD

SD is a serial data output pin. When PT2225 receives valid transmission, it will send out Serial Momentary Data Output. This data is not sustained until the next data code is inputted. This means that when there is no data input, there is no SD output. The serial data format follows the standard RS-232 (9600 Baud Rate). SD signal does not contain any parity check bit, instead it includes 1 start bit, 6 data bits and 2 stop bits. Please refer to the figure below.

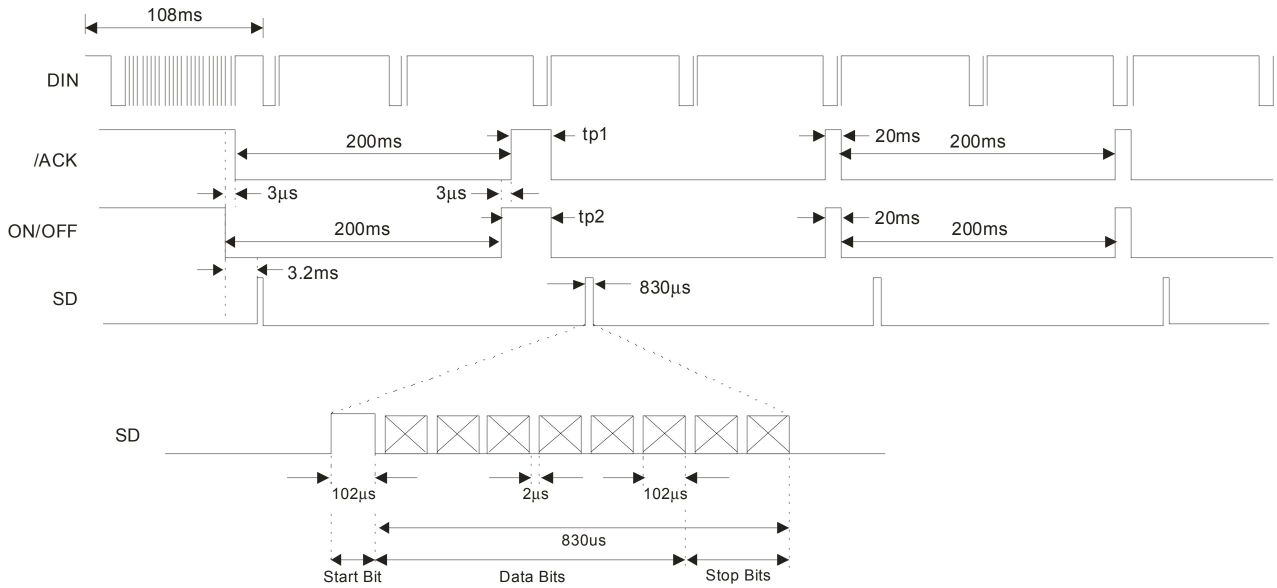

108ms
DIN
/ACK
200ms
tp1
20ms
200ms
3µs
3µs
ON/OFF
200ms
tp2
20ms
200ms
3.2ms
SD
830µs
SD
102µs
2µs
102µs
830us
Start Bit
Data Bits
Stop Bits

Figure 2. PT2225 Waveforms (Transmitter Key is Continuously Pressed)

ACKNOWLEDGE PIN: /ACK

/ACK is the Acknowledge Signal Pin. When PT2225 receives continuous valid transmission, then /ACK waveform is repetitively generated. The /ACK Waveform goes on a Low State for 200ms. This 200ms Low Pulse is then followed by a 20ms High Pulse. When PT2225 stops receiving the transmission, /ACK then goes HIGH. Please refer to the diagram below.

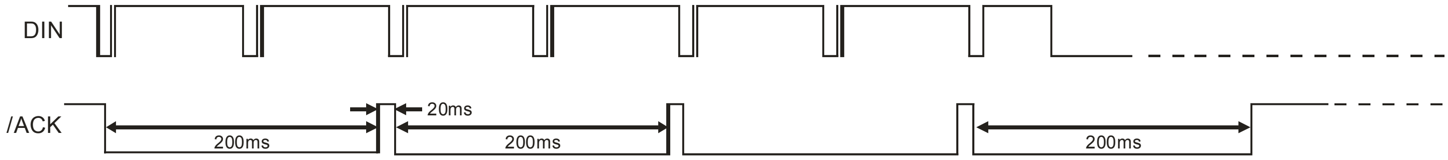

DIN
/ACK
20ms
200ms
200ms
200ms

Figure 3. /ACK Waveforms

POWER SIGNAL PIN ON/OFF:

PT2225 receives signals with 12H data codes from PT2221/2 at the DIN Pin. This 12H data code (D0~D7) = 0100,1000. When PT2225 continuously receives this signal, then the ON/OFF waveform is repetitively generated. The ON/OFF waveform consists of a 20ms high pulse generated after a 200ms low pulse. When PT2225 stops receiving the signal, ON/OFF Pin goes to HIGH. Refer to the diagram below:

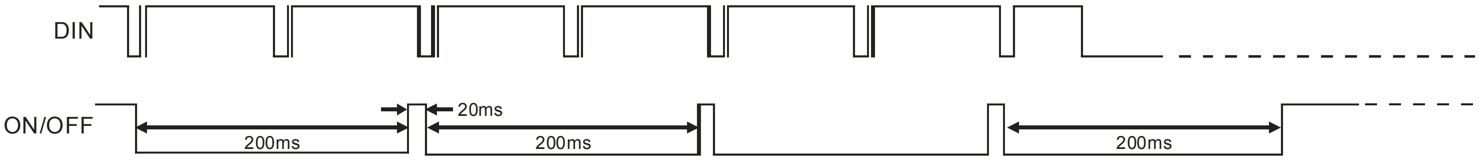
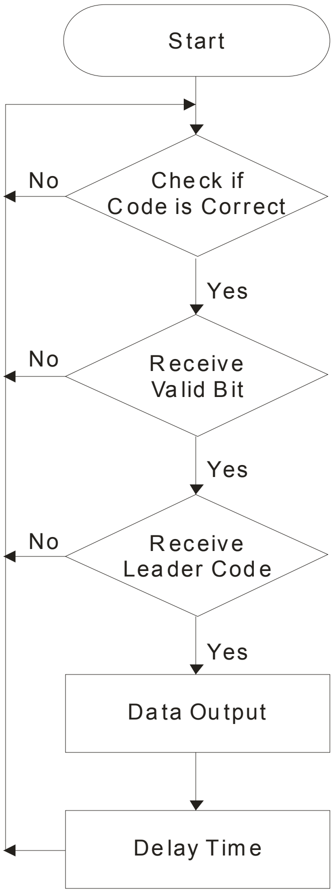


Figure 4. ON/OFF Waveforms

OPERATIONAL FLOWCHART


Start
No
Check if
Code is Correct
Yes
No
Receive
Valid Bit
Yes
No
Receive
Leader Code
Yes
Data Output
Delay Time

PT2225 KEY MAP

PT2225 Parallel Output (D0~D5)						**D0**	**D1**	**D2**	**D3**	**D4**	**D5**	**-**
PT2225 Serial Output (SD)						**D0**	**D1**	**D2**	**D3**	**D4**	**-**	**D5**
PT2221 Key	**Connection**					**PT2221 Data Code**						
	KI0	KI1	KI2	KI3	KI/O	D0	D1	D2	D3	D4	D5	D6
K1	*				KIO0	0	0	0	0	0	0	0
K2		*				1	0	0	0	0	0	0
K3			*			0	1	0	0	0	0	0
K4				*		1	1	0	0	0	0	0
K5	*				KIO1	0	0	1	0	0	0	0
K6		*				1	0	1	0	0	0	0
K7			*			0	1	1	0	0	0	0
K8				*		1	1	1	0	0	0	0
K9	*				KIO2	0	0	0	1	0	0	0
K10		*				1	0	0	1	0	0	0
K11			*			0	1	0	1	0	0	0
K12				*		1	1	0	1	0	0	0
K13	*				KIO3	0	0	1	1	0	0	0
K14		*				1	0	1	1	0	0	0
K15			*			0	1	1	1	0	0	0
K16				*		1	1	1	1	0	0	0
K17	*				KIO4	0	0	0	0	1	0	0
K18		*				1	0	0	0	1	0	0
K19			*			0	1	0	0	1	0	0
K20				*		1	1	0	0	1	0	0
K21	*				KIO5	0	0	1	0	1	0	0
K22		*				1	0	1	0	1	0	0
K23			*			0	1	1	0	1	0	0
K24				*		1	1	1	0	1	0	0
K25	*				KIO6	0	0	0	1	1	0	0
K26		*				1	0	0	1	1	0	0
K27			*			0	1	0	1	1	0	0
K28				*		1	1	0	1	1	0	0
K29	*				KIO7	0	0	1	1	1	0	0
K30		*				1	0	1	1	1	0	0
K31			*			0	1	1	1	1	0	0
K32				*		1	1	1	1	1	0	0

PT2225 Parallel Output (D0~D5)						**D0**	**D1**	**D2**	**D3**	**D4**	**D5**	**-**
PT2225 Serial Output (SD)						**D0**	**D1**	**D2**	**D3**	**D4**	**-**	**D5**
PT2222 Key	**Connection**					**PT2222 Data Code**						
	KI0	KI1	KI2	KI3	KI/O	D0	D1	D2	D3	D4	D5	D6
K1	*				KIO0	0	0	0	0	0	0	0
K2		*				1	0	0	0	0	0	0
K3			*			0	1	0	0	0	0	0
K4				*		1	1	0	0	0	0	0
K5	*				KIO1	0	0	1	0	0	0	0
K6		*				1	0	1	0	0	0	0
K7			*			0	1	1	0	0	0	0
K8				*		1	1	1	0	0	0	0
K9	*				KIO2	0	0	0	1	0	0	0
K10		*				1	0	0	1	0	0	0
K11			*			0	1	0	1	0	0	0
K12				*		1	1	0	1	0	0	0
K13	*				KIO3	0	0	1	1	0	0	0
K14		*				1	0	1	1	0	0	0
K15			*			0	1	1	1	0	0	0
K16				*		1	1	1	1	0	0	0
K17	*				KIO4	0	0	0	0	1	0	0
K18		*				1	0	0	0	1	0	0
K19			*			0	1	0	0	1	0	0
K20				*		1	1	0	0	1	0	0
K21	*				KIO5	0	0	1	0	1	0	0
K22		*				1	0	1	0	1	0	0
K23			*			0	1	1	0	1	0	0
K24				*		1	1	1	0	1	0	0
K25	*				KIO6	0	0	0	1	1	0	0
K26		*				1	0	0	1	1	0	0
K27			*			0	1	0	1	1	0	0
K28				*		1	1	0	1	1	0	0
K29	*				KIO7	0	0	1	1	1	0	0
K30		*				1	0	1	1	1	0	0
K31			*			0	1	1	1	1	0	0
K32				*		1	1	1	1	1	0	0

PT2225 Parallel Output (D0~D5)						**D0**	**D1**	**D2**	**D3**	**D4**	**D5**	**-**
PT2225 Serial Output (SD)						**D0**	**D1**	**D2**	**D3**	**D4**	**-**	**D5**
PT2222 Key	**Connection**					**PT2222 Data Code**						
	KI4	KI5	KI6	KI7	KI/O	D0	D1	D2	D3	D4	D5	D6
K33	*				KIO0	0	0	0	0	0	0	1
K34		*				1	0	0	0	0	0	1
K45			*			0	1	0	0	0	0	1
K36				*		1	1	0	0	0	0	1
K37	*				KIO1	0	0	1	0	0	0	1
K38		*				1	0	1	0	0	0	1
K39			*			0	1	1	0	0	0	1
K40				*		1	1	1	0	0	0	1
K41	*				KIO2	0	0	0	1	0	0	1
K42		*				1	0	0	1	0	0	1
K43			*			0	1	0	1	0	0	1
K44				*		1	1	0	1	0	0	1
K45	*				KIO3	0	0	1	1	0	0	1
K46		*				1	0	1	1	0	0	1
K47			*			0	1	1	1	0	0	1
K48				*		1	1	1	1	0	0	1
K49	*				KIO4	0	0	0	0	1	0	1
K50		*				1	0	0	0	1	0	1
K51			*			0	1	0	0	1	0	1
K52				*		1	1	0	0	1	0	1
K53	*				KIO5	0	0	1	0	1	0	1
K54		*				1	0	1	0	1	0	1
K55			*			0	1	1	0	1	0	1
K56				*		1	1	1	0	1	0	1
K57	*				KIO6	0	0	0	1	1	0	1
K58		*				1	0	0	1	1	0	1
K59			*			0	1	0	1	1	0	1
K60				*		1	1	0	1	1	0	1
K61	*				KIO7	0	0	1	1	1	0	1
K62		*				1	0	1	1	1	0	1
K63			*			0	1	1	1	1	0	1
K64				*		1	1	1	1	1	0	1

Note: D5 and D7 Data Codes of PT2221/2 will not affect the output of PT2225.

ABSOLUTE MAXIMUM RATINGS

Description	Symbol	Rating	Unit
Supply Voltage *	VDD	-0.3~6.0	V
Input Voltage *	VI	-0.3~VDD+0.3	V
Output Voltage*	VO	-0.3~VDD+0.3	V
Operating Temperature	Topr	-40~+85	℃
Storage Temperature	Tstg	-65~+150	℃

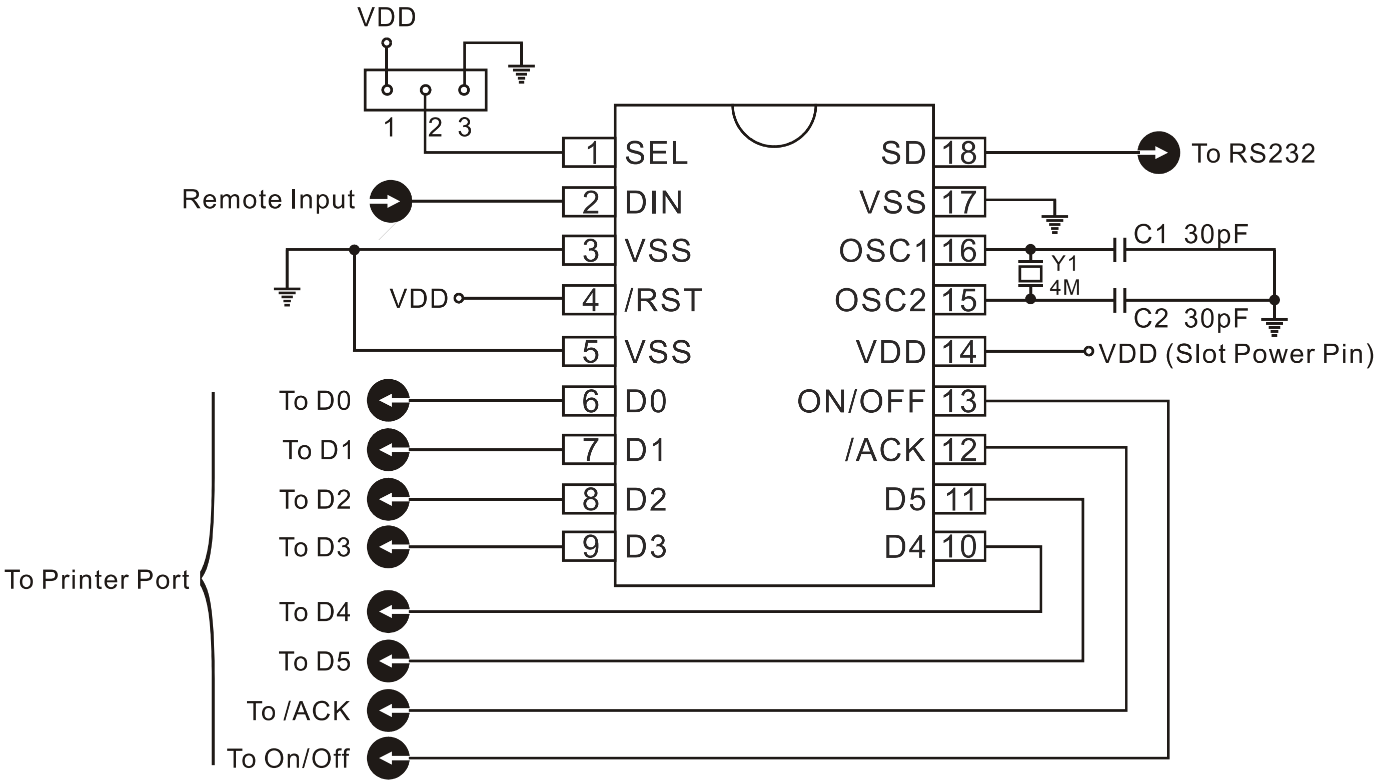
Note: * = with reference to VSS

DC CHARACTERISTICS

(VDD=5 V, T=25℃)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	VDD		4.0	5.0	6.0	V
Stand-by Current	ISD	All input pins are connected to VDD. All output pins are open.		25	300	µA
Operating Current	IDD	OSC=4MHz			1.8	mA
Input High Level Voltage (DIN, /RST)	VIH1		0.7VDD		VDD	V
Input Low Level Voltage (DIN, /RST)	VIL1		VSS		0.2VDD	V
H Level Output Current (D0~D5, SD, /ACK, ON/OFF)	IOH1	Vo=4V	-6	-8		mA
H Level Output Current (D0~D5, SD, /ACK, ON/OFF)	IOH2	Vo=1V	-15	-20		mA
Sink Current (D0~D5, SD, /ACK, ON/OFF, DIN)	ISINK	Vo=1V	4.0	6.0		mA
Oscillator Capacitor	VDD=5V OSC=4MHz		15	30	100	pF

APPLICATION CIRCUIT

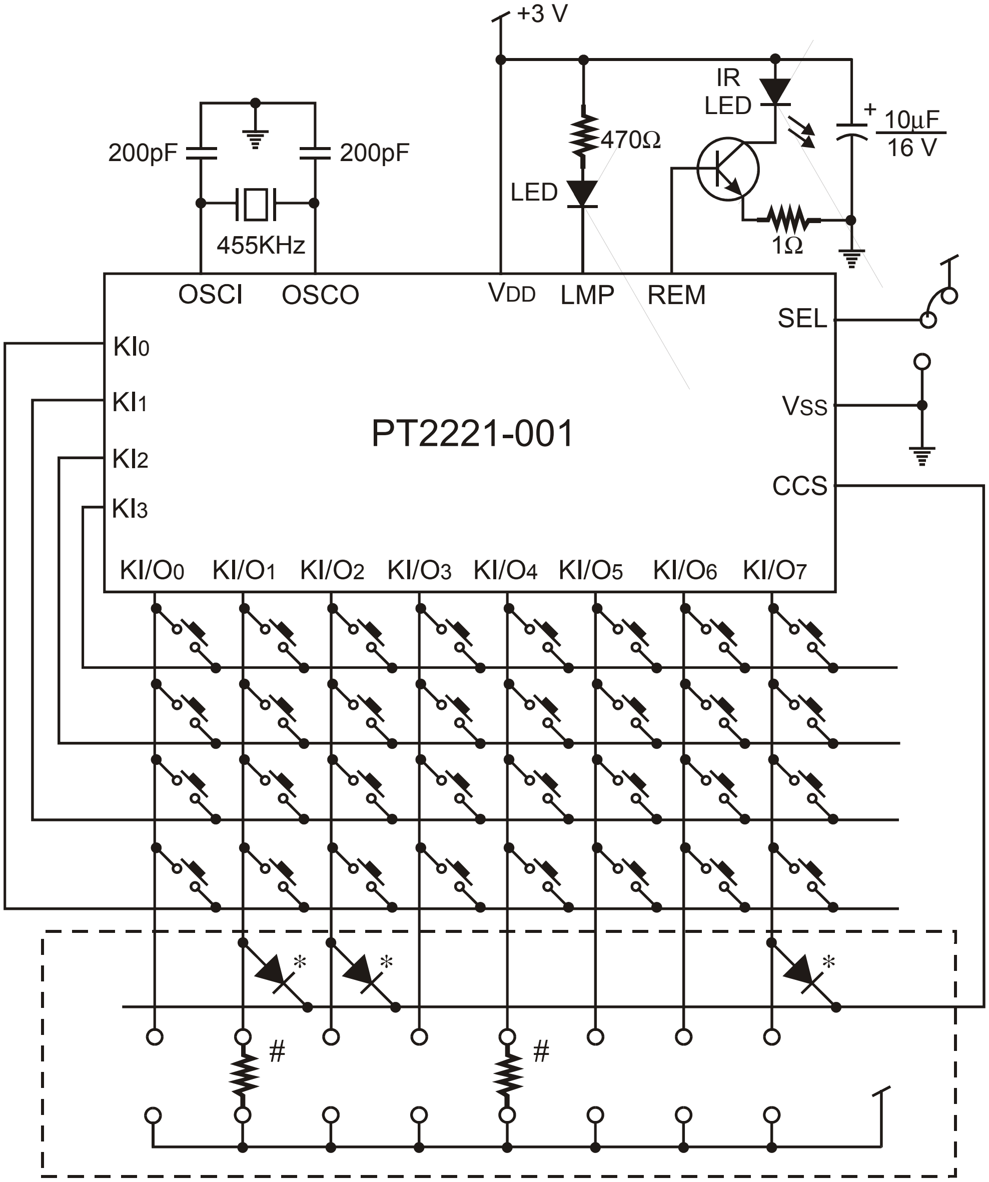

VDD
1
2
3
SEL
DIN
VSS
/RST
VSS
D0
D1
D2
D3
SD
VSS
OSC1
OSC2
VDD
ON/OFF
/ACK
D5
D4
1
2
3
4
5
6
7
8
9
18
17
16
15
14
13
12
11
10
Remote Input
VDD
To D0
To D1
To D2
To D3
To Printer Port
To D4
To D5
To /ACK
To On/Off
To RS232
C1 30pF
Y1
4M
C2 30pF
VDD (Slot Power Pin)

Note:

1. When PT2225 is used with PT2221-001 or PT2221-002, the printer port and the serial bus functions can be used.
2. When PT2225 is used with PT2222-001 or PT2222-002, only the serial bus can be used.

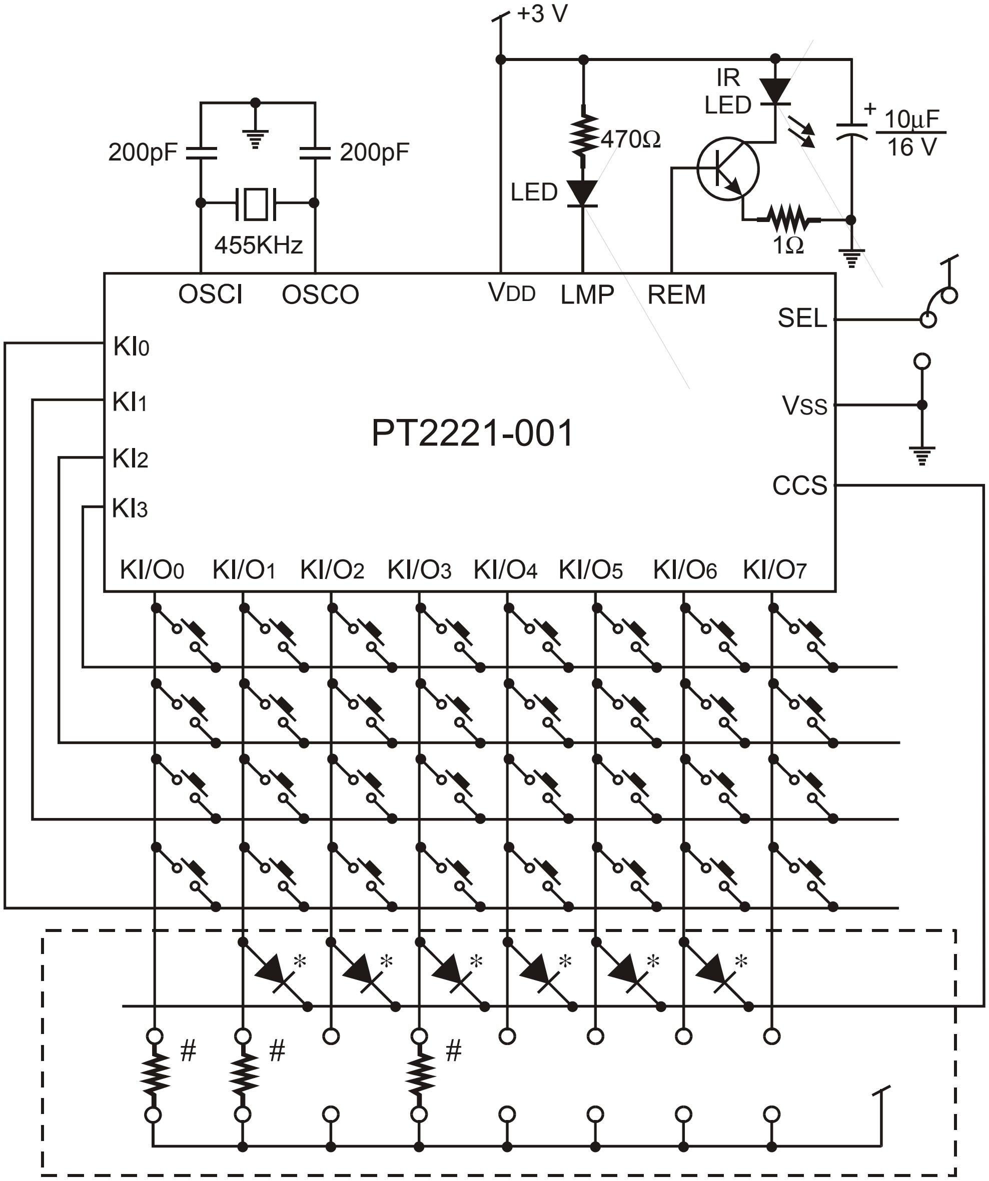
PT2221-001 APPLICATION CIRCUIT

CUSTOM CODE=866B


+3 V
IR LED
10µF 16 V
200pF
200pF
470Ω
LED
455KHz
1Ω
OSCI
OSCO
VDD
LMP
REM
SEL
KI0
KI1
KI2
KI3
PT2221-001
VSS
CCS
KI/O0
KI/O1
KI/O2
KI/O3
KI/O4
KI/O5
KI/O6
KI/O7
*
*
*
#
#

# For Pull-High, Resistor =100K
* IN4148

CUSTOM CODE=FC08

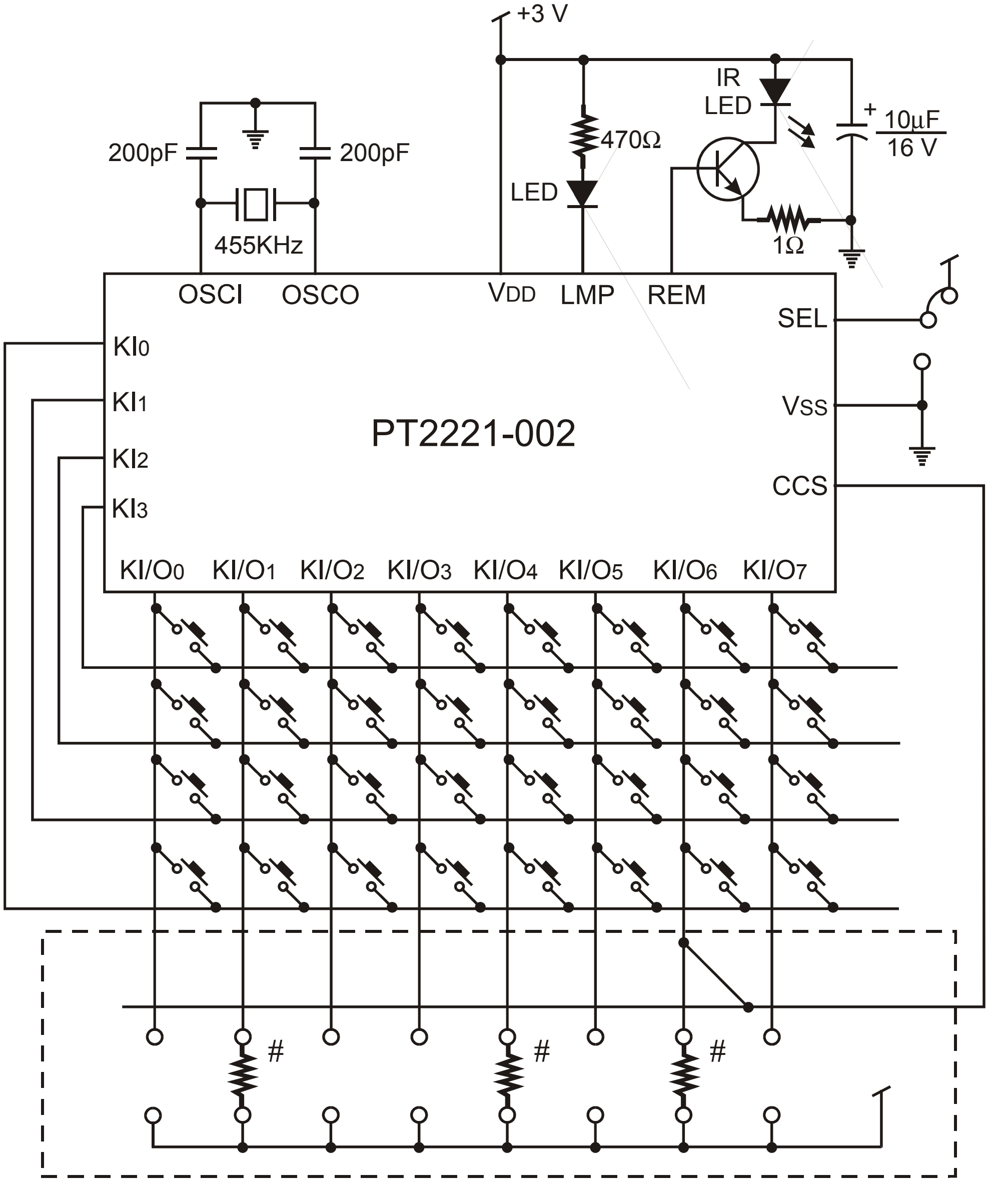

+3 V
IR
LED
10µF
16 V
200pF
200pF
470Ω
LED
455KHz
1Ω
OSCI
OSCO
VDD
LMP
REM
SEL
KI0
KI1
KI2
KI3
VSS
CCS
PT2221-001
KI/O0
KI/O1
KI/O2
KI/O3
KI/O4
KI/O5
KI/O6
KI/O7
*
#

# For Pull-High, Resistor =100K

* IN4148

PT2221-002 APPLICATION CIRCUIT

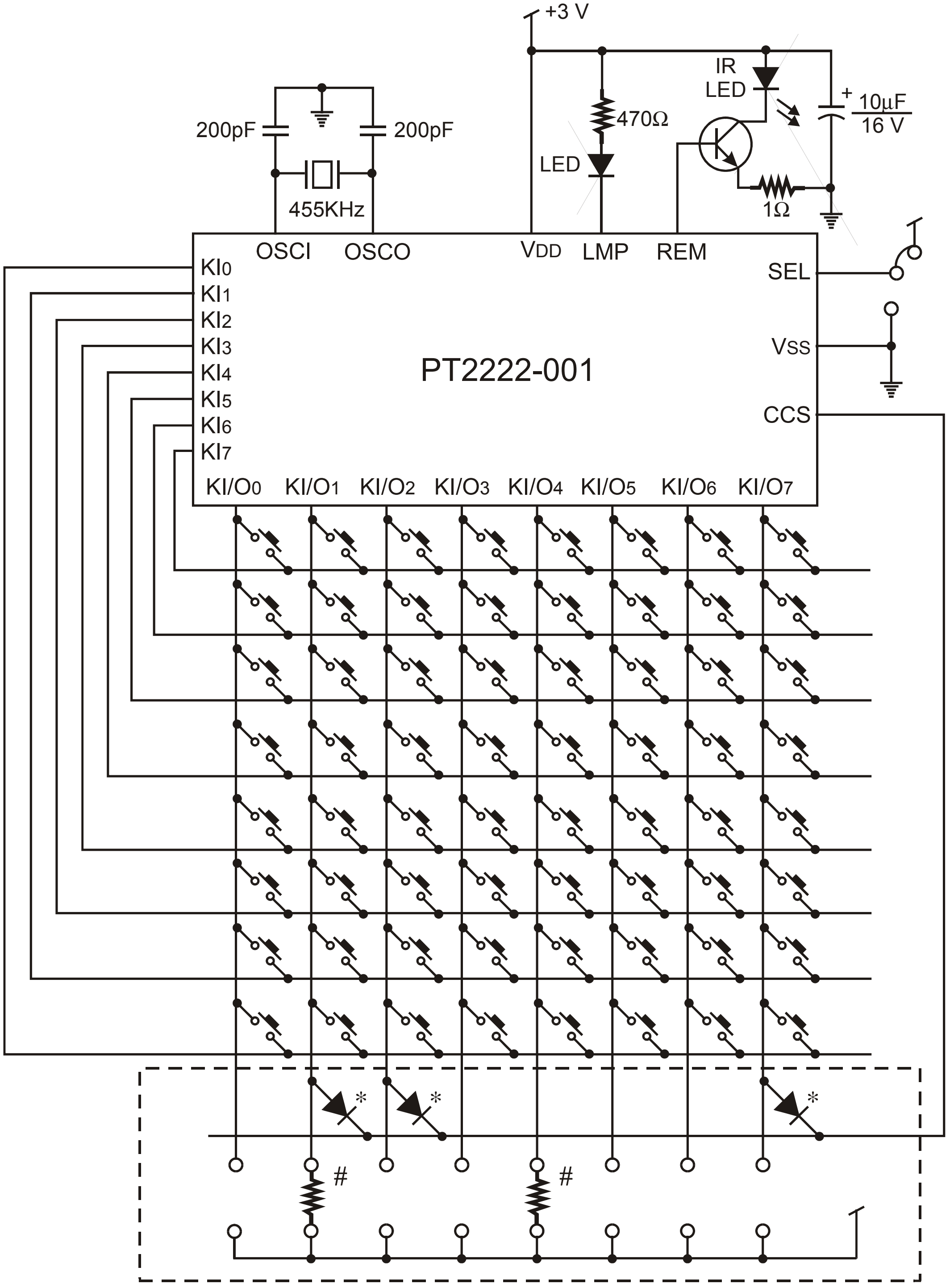
CUSTOM CODE=866B


+3 V
IR LED
200pF
200pF
470Ω
10µF 16 V
LED
455KHz
1Ω
OSCI
OSCO
VDD
LMP
REM
SEL
KI0
KI1
PT2221-002
VSS
KI2
CCS
KI3
KI/O0
KI/O1
KI/O2
KI/O3
KI/O4
KI/O5
KI/O6
KI/O7
#
#
#

For Pull-High, Resistor =100K
∗ IN4148

PT2222-001 APPLICATION CIRCUIT

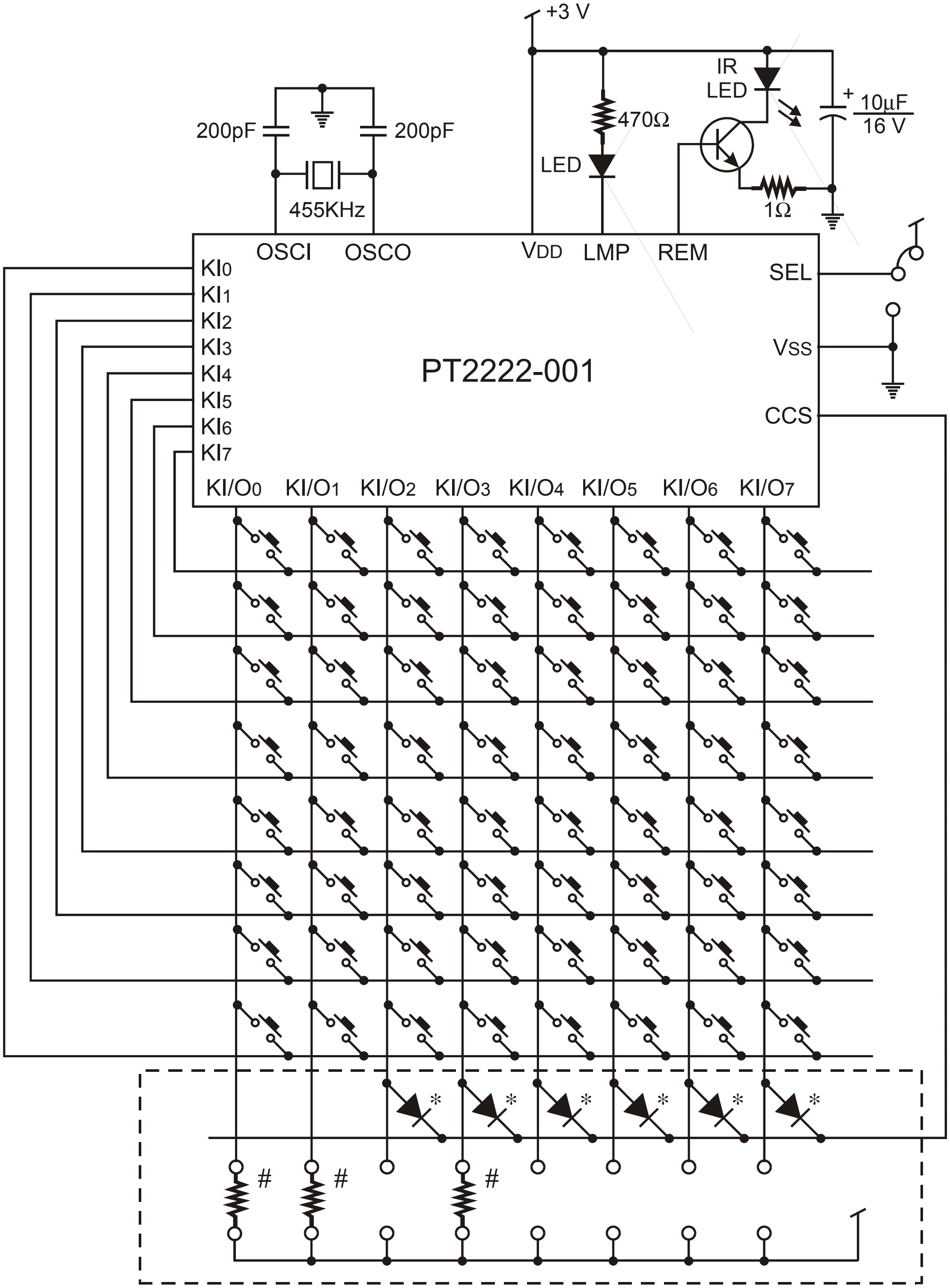
CUSTOM CODE=866B


+3 V
200pF
200pF
455KHz
470Ω
LED
IR LED
10µF 16 V
1Ω
OSCI
OSCO
VDD
LMP
REM
SEL
VSS
CCS
KI0
KI1
KI2
KI3
KI4
KI5
KI6
KI7
PT2222-001
KI/O0
KI/O1
KI/O2
KI/O3
KI/O4
KI/O5
KI/O6
KI/O7
*
*
*
#
#

For Pull-High, Resistor =100K

* IN4148

CUSTOM CODE = FC08

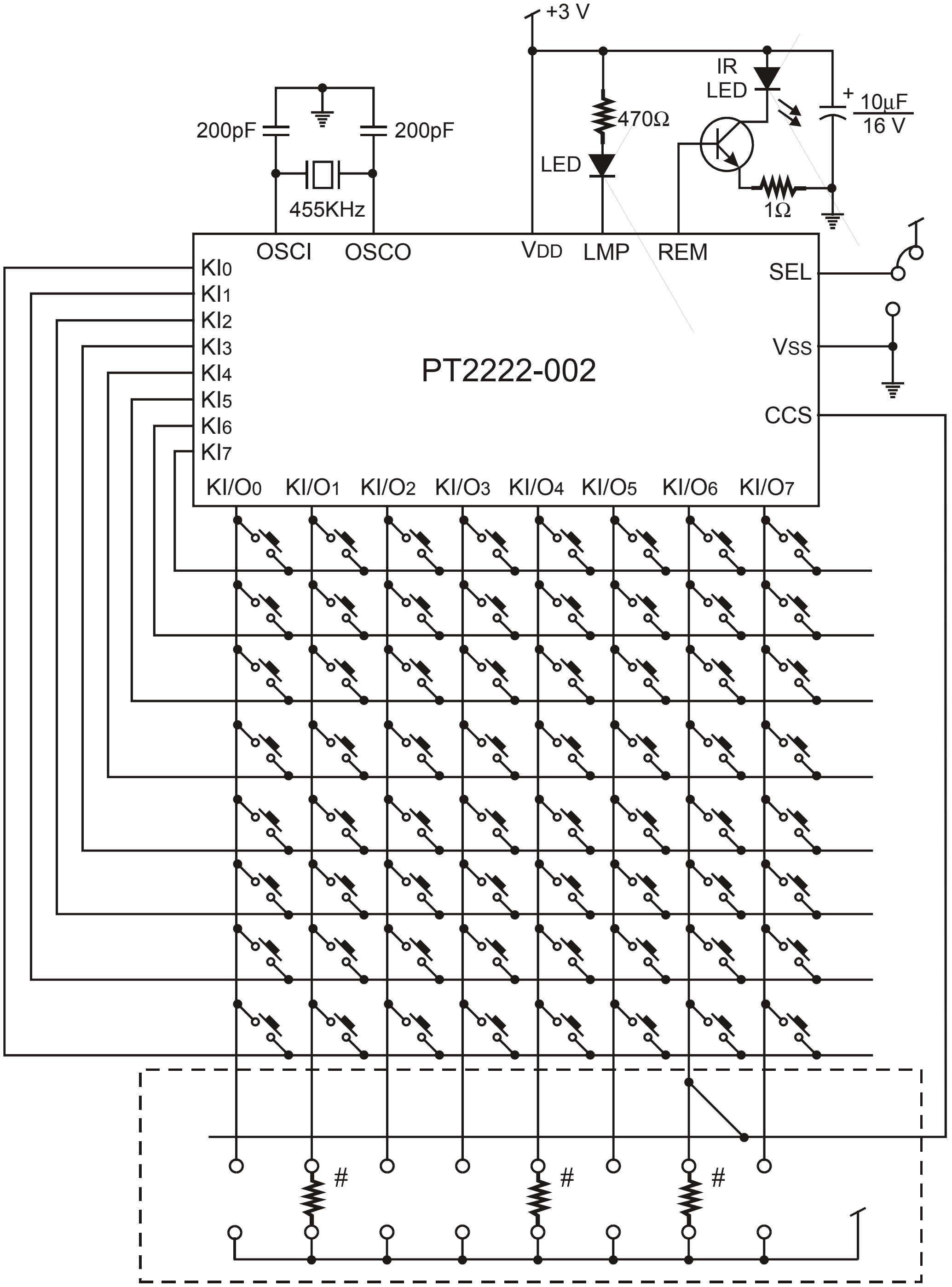

+3 V
200pF
200pF
455KHz
470Ω
LED
IR
LED
10µF
16 V
1Ω
OSCI
OSCO
VDD
LMP
REM
SEL
VSS
CCS
PT2222-001
KI0
KI1
KI2
KI3
KI4
KI5
KI6
KI7
KI/O0
KI/O1
KI/O2
KI/O3
KI/O4
KI/O5
KI/O6
KI/O7
*
#

# For Pull-High, Resistor =100K

* IN4148

PT2222-002 APPLICATION CIRCUIT

CUSTOM CODE = 866B


+3 V
IR
LED
+
10µF
16 V
200pF
200pF
470Ω
LED
455KHz
1Ω
OSCI
OSCO
VDD
LMP
REM
SEL
VSS
CCS
KI0
KI1
KI2
KI3
KI4
KI5
KI6
KI7
PT2222-002
KI/O0
KI/O1
KI/O2
KI/O3
KI/O4
KI/O5
KI/O6
KI/O7
#
#
#

For Pull-High, Resistor =100K

* IN4148

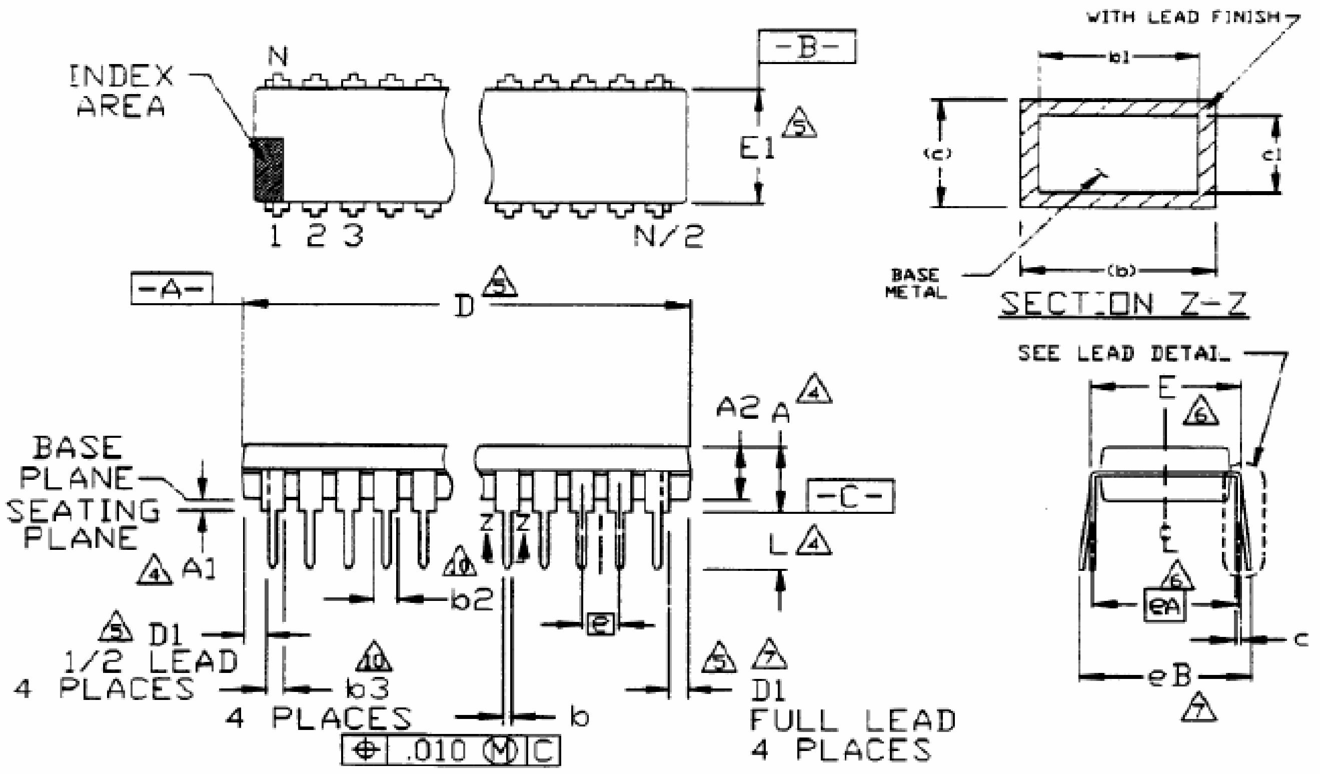
ORDER INFORMATION

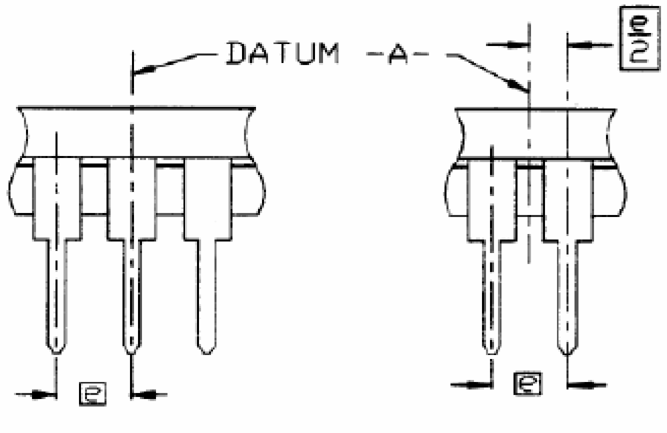
Valid Part Number	Package	Top Code
PT2225	18 Pins, SOP, 300mil	PT2225
PT2225-D	18 Pins, DIP, 300mil	PT2225-D
PT2225 (L)	18 Pins, SOP, 300mil	PT2225
PT2225-D (L)	18 Pins, DIP, 300mil	PT2225-D

Notes:
1. (L), (C) or (S) = Lead Free.
2. The Lead Free mark is put in front of the date code.

PACKAGE INFORMATION

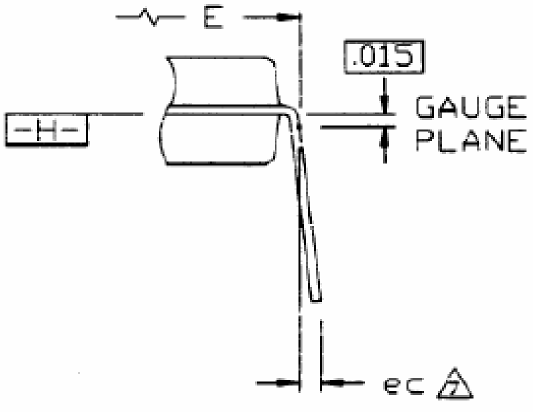
18 PINS, DIP, 300MIL


INDEX AREA
N
1 2 3
N/2
-B-
E1
5
WITH LEAD FINISH
b1
(c)
c1
BASE METAL
(b)
SECTION Z-Z
-A-
D
5
SEE LEAD DETAIL
E
6
A2
A
4
-C-
BASE PLANE
SEATING PLANE
4 A1
Z Z
L 4
10
b2
e
eA
6
c
5 D1
1/2 LEAD
4 PLACES
10
b3
4 PLACES
b
⊕ .010 Ⓜ C
5 7
D1
FULL LEAD
4 PLACES
eB
7


DATUM -A-
e/2
e
e

ODD LEADS

EVEN LEADS


E
.015
-H-
GAUGE PLANE
eC 7

LEAD DETAIL

Symbol	Min.	Nom.	Max.
A	-	-	0.210
A1	0.150		
A2	0.115	0.130	0.195
b	0.014	0.018	0.022
b2	0.045	0.060	0.070
b3	0.03	0.039	0.045
c	0.008	0.010	0.014
c1	0.008	0.010	0.011
D	0.880	0.900	0.920
D1	0.005	-	-
E	0.300	0.310	0.325
E1	0.240	0.250	0.280
e	0.100 BAS.		
eA	0.300 BAS.		
eB	-	-	0.430
eC	0.000	-	0.600
L	0.115	0.130	0.150

Note:

1. All dimensioning are in INCHES.
2. Dimensioning and tolerancing per ANSI Y14.5M-1982.
3. Dimension“A”,“A1”and “L” are measured with package seated in JEDEC Seating Plane Gauge GS-3.
4. “D”, “D1” and “E1” dimensions do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.010 inch.
5. “E” and “eA” measured with the leads constrained to be perpendicular to datum -c- .
6. “eB” and “eC” are measured at the lead tips with the leads unconstrained.
7. “N” is the number of terminal position (N=18).
8. Pointed or rounded lead tips are preferred to ease insertion.
9. “b2” and “b3” maximum dimensions are not include dambar protrusions. Damber protrusions shall not exceed 0.010 inch (0.25mm)
10. Distance between leads including Damber protrusions to be 0.005 inch minimum.
11. Datum plane -H- coincident with the bottom of lead, where lead exits body.
12. Refer to JEDEC MS-001, Variation AC

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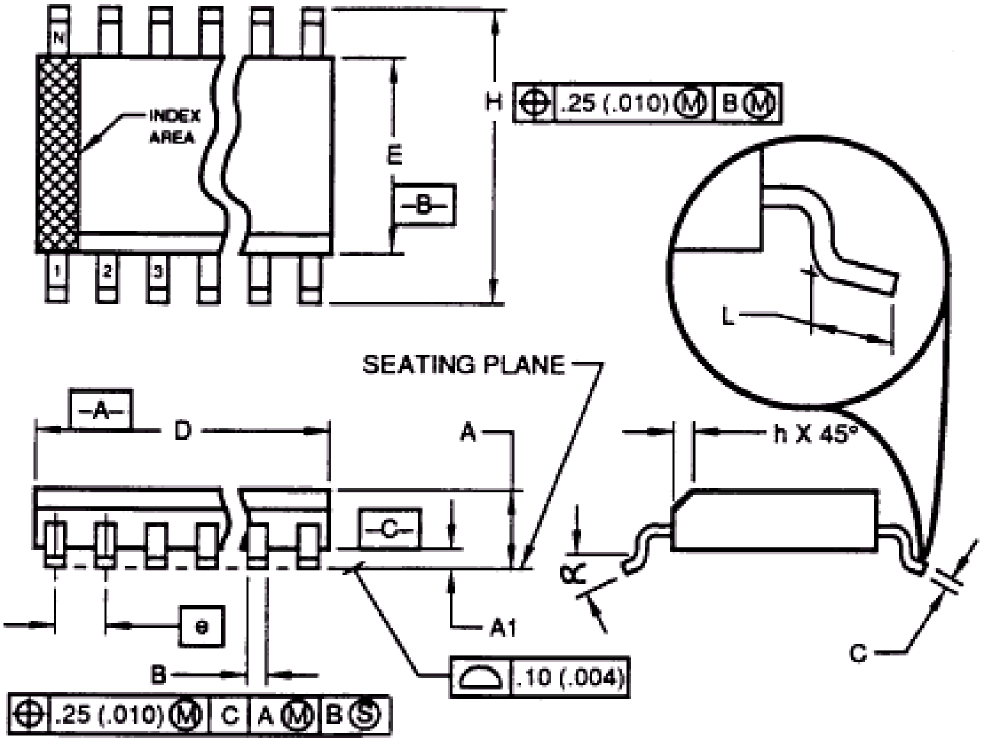
18 PINS, SOP, 300MIL


N
INDEX AREA
1
2
3
E
-B-
H
.25 (.010) M B M
L
SEATING PLANE
-A-
D
A
h X 45°
-C-
α
A1
e
B
.10 (.004)
C
.25 (.010) M C A M B S

Symbol	Min.	Nom.	Max.
A	2.35	-	2.65
A1	0.10	-	0.30
B	0.33	-	0.51
C	0.23	-	0.32
D	11.35	-	11.75
E	7.40	-	7.60
e	1.27 BAS.		
H	10.00	-	10.65
h	0.25	-	0.75
L	0.40	-	1.27
∞	0°	-	8°

Notes:

1. Dimensioning and tolerancing per ANSI Y14.5-1982.
2. Dimension “D” does not include mold flash, protrusions or gate burrs. Mold Flash protrusion or gate burrs shall not exceed 0.15mm (0.006 in) per side.
3. Dimension “E” does not include interlead flash or protrusions. Interlead flash or protrusions shall not exceed 0.25mm (0.010 in) per side.
4. The chamfer on the body is optional. It is not present, a visual index feature must be located within the crosshatched area.
5. “L” is the length of the terminal for soldering to substrate.
6. “N” is the number of terminal positions. (N=18)
7. The lead width “B” as measured 0.36mm (0.014 in) or greater above the seating plane, shall not exceed a maximum value of 0.61mm (0.24 in)
8. Controlling dimension: MILLIMETER.
9. Refer to JEDEC MS-013 Variation AB.

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