

FEATURES

- 16 constant-current output channels
- Constant output current range:
3~45 mA at VDD=3.3V
3~60 mA at VDD=5V
- Output current accuracy:
between channels: $\pm 3\%$ (max.), and
between ICs: $\pm 6\%$ (max.)
- Staggered output delay
- Maximum data clock frequency: 25MHz
- Output current adjusted through an external resistor
- Schmitt trigger input
- Fast response of output current, OE (min.):
200 ns
- 3.0V-5V supply voltage

Applications

- LED Display Driver
- Portable Communication Devices
- Handheld Electronics
- Lightings

PART NUMBER EXAMPLES

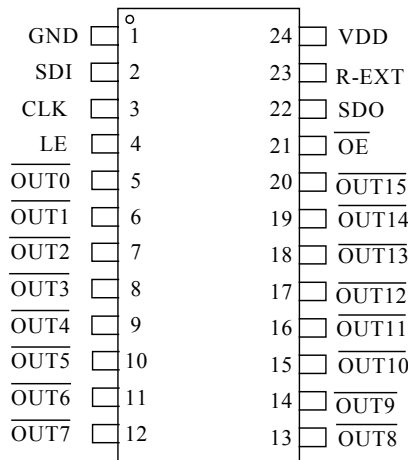
PART NO.	PACKAGE	Pin Out
T6505A-ADG	SOP-24	Type A
T6505A-AEG	SSOP-24	Type A
T6505A-BDG	SOP-24	Type B
T6505A-BEG	SSOP-24	Type B

GENERAL DESCRIPTION

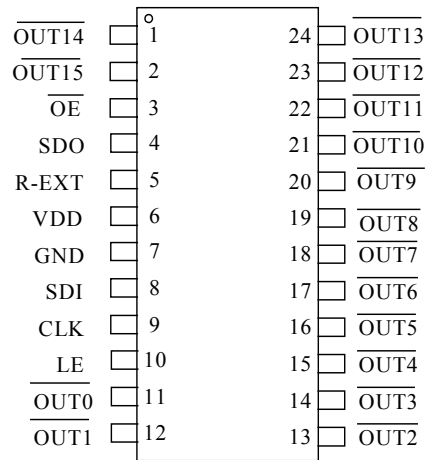
T6505A is designed for LED displays. As an enhancement of its predecessor, T6505A contains a serial buffer and data latches which convert serial input data into parallel output format. At T6505A output stage, sixteen regulated current ports are designed to provide uniform and constant current sinks for driving LEDs within a large range of Vf variations.

T6505A provides users with great flexibility and device performance while using T6505A in their system design for LED display applications, e.g. LED panels. Users may adjust the output current from 3 mA to 60 mA through an external resistor Rext, which gives users flexibility in controlling the light intensity of LEDs. T6505A guarantees to endure maximum 5V at the output port. The high clock frequency, 25 MHz, also satisfies the system requirements of high volume data transmission. The T6505A is available in SOP-24 and SSOP-24 lead-free package.

PIN ARRANGEMENT(Top view)



Type A
T6505A-ADG
T6505A-AEG



Type B
T6505A-BDG
T6505A-BEG

PIN DESCRIPTION

SYMBOL	Pin no.	DESCRIPTION
GND	1	Ground
SDI	2	Serial-data input to the shift register
CLK	3	rising edge and carries command information when LE is asserted
LE	4	Data strobe terminal and controlling
OUT0 ~ OUT15	5 ~ 20	Constant current output terminals
OE	21	Output enable terminal, When OE (active) low, the output drivers are enabled; when OE high, all output, drivers are turned OFF (blanked)
SDO	22	Serial-data output to the receiver-end SDI of next driver IC
R-EXT	23	Input terminal used to connect an external R-EXT resistor for setting up output current for all output channels
VDD	24	Power supply

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Voltage on any pin relative to GND	V _{IN}	-0.3 to 7	V
Operating Temperature Rang	T _A	-40 to +85	°C
Sustaining Voltage at Outpout Ports	V _{DS}	8	V
Maximum Soldering Temperature (at leads, 10 sec)	T _{LEAD}	300	°C
Storage Temperature Rang	T _S	-55 to +150	°C
Continuous Power Dissipation (T _A = +25°C)	SOP	2.12	W
	SSOP	1.73	

DC Electrical Characteristics

 (T_A = -40 to 85°C unless otherwise noted. Typical values are at T_A = 25°C)

Symbol	Description	Conditions	Min.	Typ.	Max	Unit		
V _{DD}	Operating voltage range		3	-	5	V		
V _{DS}	Sustaining Voltage at Outpout Ports	/OUT0 ~ /OUT15	-	-	8	V		
I _{OUT}	Output Current	V _{DD} =3.3V	3	-	45	mA		
		V _{DD} =5V	3	-	60			
V _{IH}	Input high voltage		0.7*V _{DD}	-	V _{DD}	V		
V _{IL}	Input low voltage		GND	-	0.3*V _{DD}	V		
V _{OH}	Output high voltage	I _{OH} = -1.0mA	4.6	-	-	V		
V _{OL}	Output low voltage	I _{OL} =1.0mA	-	-	.04	V		
I _{IL}	Output leakage current in shutdown	V _{DS} =5V	-	-	0.5	uA		
FDCLK	Data Clock Frequency		-	-	25	MHz		
I _{OTC}	Over temperature output current		-	I _{OUT} *0.5	-	mA		
T _{TP}	Thermal Protect		-	160	-	°C		
I _{OUT1}	Output Current 1	V _{DS} =1V, R _{EXT} =1240 Ω	-	15	-	mA		
dI _{OUT1}	Current Skew	V _{DS} =1V, R _{EXT} =1240 Ω, I _{OL} =15mA	-	-	±3	%		
I _{OUT2}	Output Current 1	V _{DS} =1V, R _{EXT} =620 Ω	-	30	-	mA		
dI _{OUT2}	Current Skew	V _{DS} =1V, R _{EXT} =620 Ω, I _{OL} =30mA	-	-	±3	%		
R _{IN(UP)}	Pull-up resistor	/OE	250	500	800	KΩ		
R _{IN(DN)}	Pull-down resistor	LE	250	500	800	KΩ		
I _{DDoff1}	Supply Current (V _{DD} =5V)	OFF	R _{EXT} =Open, /OUT0~15=Off		-	2.0	5.0	mA
I _{DDoff2}			R _{EXT} =1240Ω, /OUT0~15=Off		-	2.0	5.0	mA
I _{DDoff3}			R _{EXT} =620Ω, /OUT0~15=Off		-	2.5	5.0	mA
I _{DDon1}		ON	R _{EXT} =1240Ω, /OUT0~15=On		-	2.5	5.0	mA
I _{DDon2}			R _{EXT} =620Ω, /OUT0~15=On		-	3.0	5.0	mA
I _{DDoff1}			R _{EXT} =Open, /OUT0~15=Off		-	1.5	5.0	mA
I _{DDoff2}	Supply Current (V _{DD} =3.3V)	OFF	R _{EXT} =1240Ω, /OUT0~15=Off		-	2.0	5.0	mA
I _{DDoff3}			R _{EXT} =620Ω, /OUT0~15=Off		-	2.0	5.0	mA
I _{DDon1}			R _{EXT} =1240Ω, /OUT0~15=On		-	2.0	5.0	mA
I _{DDon2}		R _{EXT} =620Ω, /OUT0~15=On		-	3.0	5.0	mA	

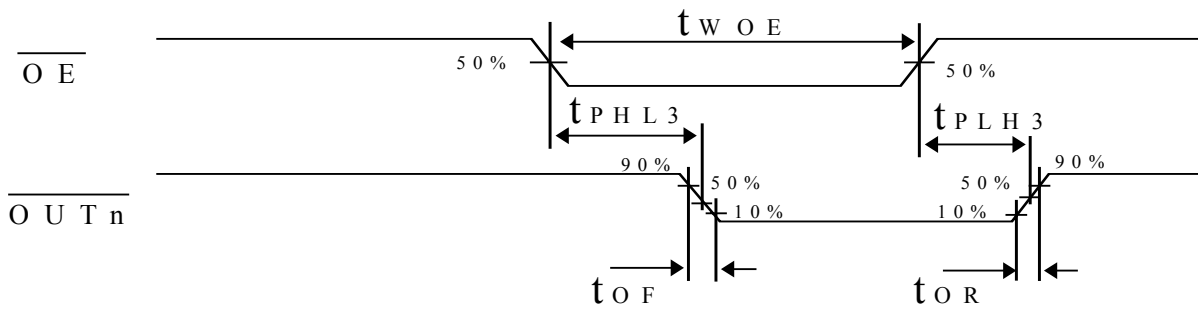
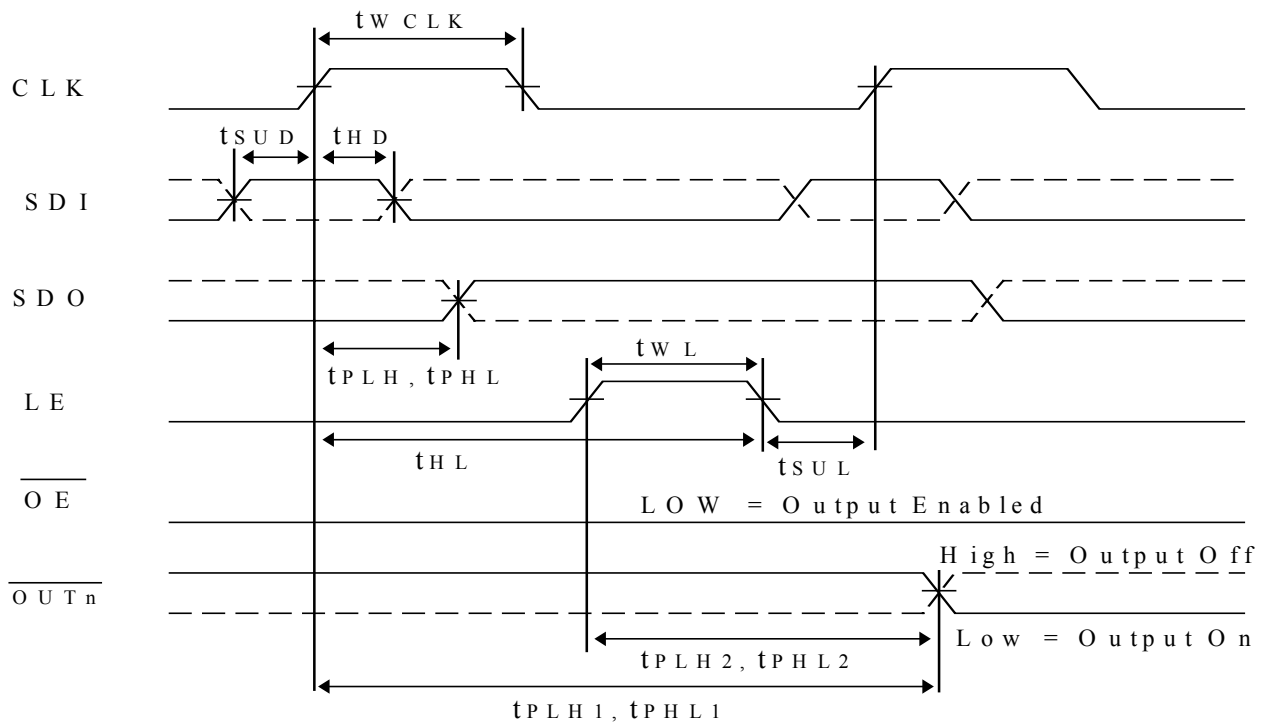
AC Electrical Characteristics

(TA = -40 to 85°C unless otherwise noted. Typical values are at TA =25°C)

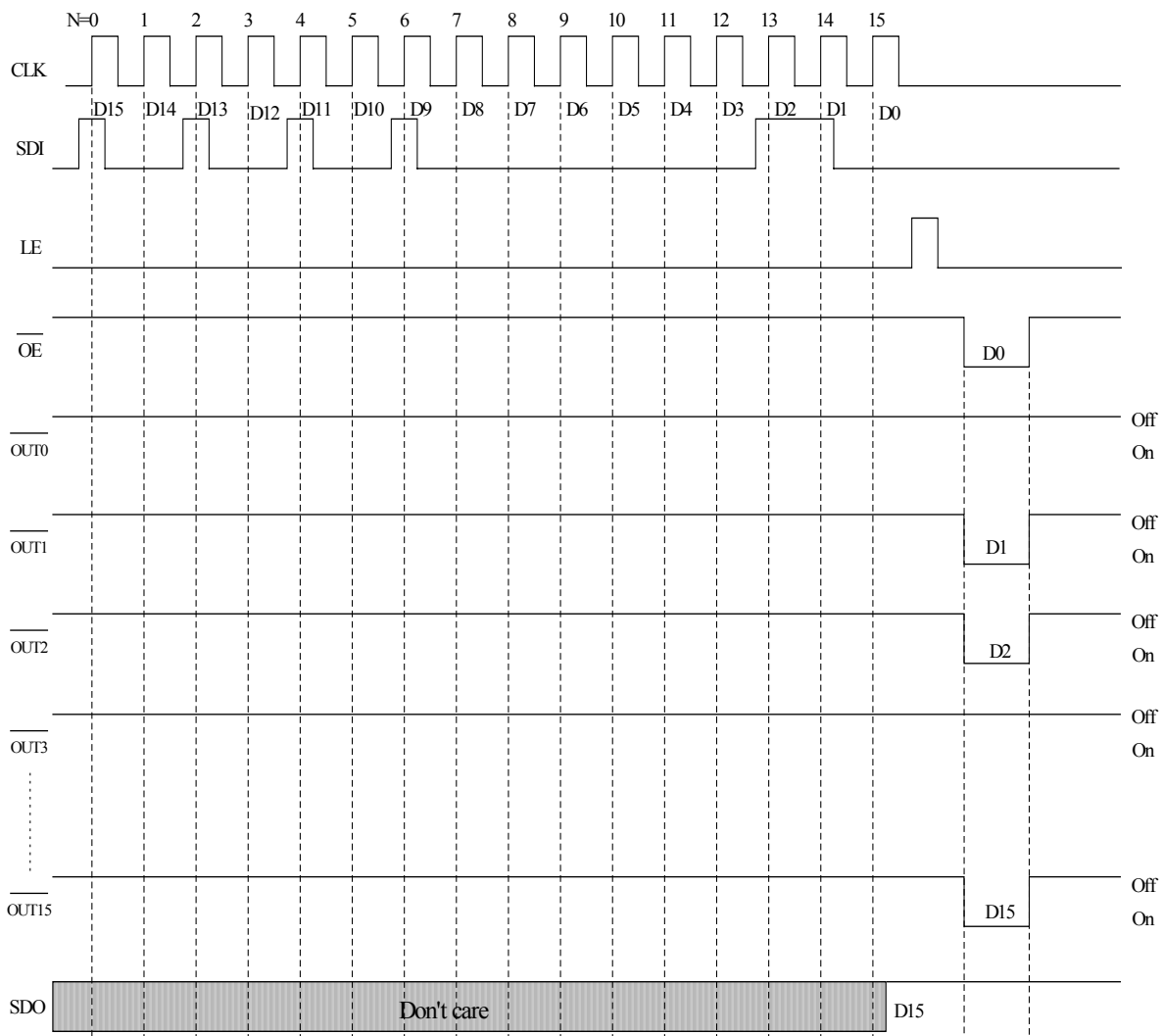
Symbol	Description	Conditions	Min.	Typ.	Max	Unit
t _{PLH1}	Propagation Delay Time ("L" to "H")	CLK to /OUTn	-	40	60	ns
t _{PLH2}		LE to /OUTn	-	40	60	ns
t _{PLH3}		/OE to /OUTn	-	20	30	ns
t _{PLH}		CLK to SDO	15	20	-	ns
t _{PHL1}	Propagation Delay Time ("H" to "L")	CLK to /OUTn	-	30	60	ns
t _{PHL2}		LE to /OUTn	-	30	60	ns
t _{PHL3}		/OE to /OUTn	-	20	40	ns
t _{PHL}		CLK to SDO	15	20	-	ns
t _{WCLK}	Pulse Width	CLK	20	-	-	ns
t _{WL}		LE	20	-	-	ns
t _{WOE}		/OE	200	-	-	ns
t _{HL}	LE Hold Time		5	-	-	ns
t _{SUL}	LE Setup Time		5	-	-	ns
t _{HD}	SDI Hold Time		10	-	-	ns
t _{SUD}	SDI Setup Time		5	-	-	ns
t _F	CLK Fall Time		-	-	500	ns
t _R	CLK Rise Time		-	-	500	ns
t _{OF}	Output Fall Time of Vout (turn on)			25	80	ns
t _{OR}	Output Rise Time of Vout (turn off)			50	200	ns

V_{DD}=5.0V
 V_{IH}=V_{DD}
 V_{IL}=GND
 R_{EXT}=930 ohm
 V_{LED}=4.5V
 R_L=162 ohm
 C_L=10 pF

Timing Waveform



Timing Waveform



Truth Table

CLK	LE	/OE	SDI	/OUT0...../OUT7...../OUT15	SDO
	H	L	D _n	/D _n/D _{n-7}/D _{n-15}	D _{n-15}
	L	L	D _{n+1}	No Change	D _{n-14}
	H	L	D _{n+2}	/D _{n+2}/D _{n-5}/D _{n-13}	D _{n-13}
	X	L	D _{n+3}	/D _{n+2}/D _{n-5}/D _{n-13}	D _{n-13}
	X	H	D _{n+3}	Off	D _{n-13}