TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8532P, TA8532F

BATTERY CHARGER IC

TA8532P, TA8532F is Battery Charger IC for Lead Batterys and applicable to various types from 1 to 6cells. Simple system with minimized external components is available.

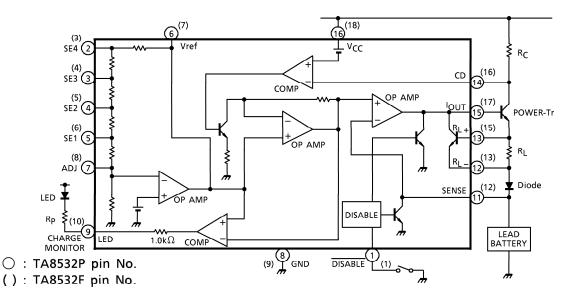
FEATURES

- Applicable to various types of lead battery from 1 to 6 cells utilizing selectable reference voltage.
- Reference voltage can be adjusted by external resistor.
- Charging time can be set freely by changing the external current (charging current) with the external resistor.
- Charging completion can be indicated by LED utilizing the charge monitor circuit.
- This device can be disabled externally.
- Battery discharge at power off can be protected by the reverse current protection system.

DIP16-P-300-2.54A TA8532F SOP18-P-375-1.27

Weight DIP16-P-300-2.54A: 1.0g (Typ.) SOP18-P-375-1.27: 0.5g (Typ.)

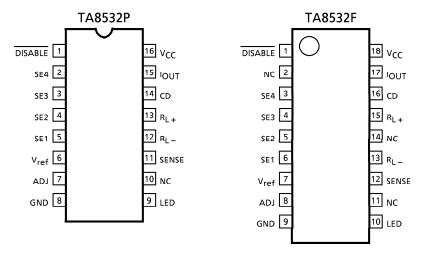
SYSTEM BLOCK DIAGRAM



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PIN CONNECTION (TOP VIEW)



PIN FUNCTION

	1					
PIN N	o. PIN NAME	FUNCTION				
1 (1	I) DISABLE	To stop charging by L input.				
2 (3	3) SE4	Selection terminal for 5cells connecting with V _{ref} terminal.				
3 (4	1) SE3	Selection terminal for 4cells connecting with V _{ref} terminal.				
4 (5	5) SE2	Selection terminal for 3cells connecting with V _{ref} terminal.				
5 (6	5) SE1	Selection terminal for 2cells connecting with V _{ref} terminal.				
6 (7	7) V _{ref}	Standard Voltage Terminal.				
7 (8	B) ADJ	To adjust the V_{ref} terminal output. And 1cell is selected connecting with V_{ref} terminal through a variable resistor.				
8 (9) GND	Ground				
9 (1	0) LED	For the LED indication during the charging (Output current>I _{CL}).				
11 (1	2) SENSE	To sense the battery output voltage.				
12 (1	3) R _L _	For connection with the current the limiting resistance. The limiting current is given $(0.7/R_L)$.				
13 (1	5) R _{L+}	The current limiting resistor is connected between R _L .				
Connecting terminal for the current sense resistor is to be connected to the internal of		Connecting terminal for the current sense resistor and Power transistor. The resistor is to be connected to the internal current sense circuit and makes the slope $\Delta V_{C}/\Delta I_{C}$. It is also connected to the charge monitor circuit and control lighting LED.				
15 (1	7) I _{OUT}	The charging current output terminal. The emitter of Power transistor to be connected.				
16 (1	8) V _{CC}	Power Supply Voltage Terminal.				

(): TA8532F pin No.

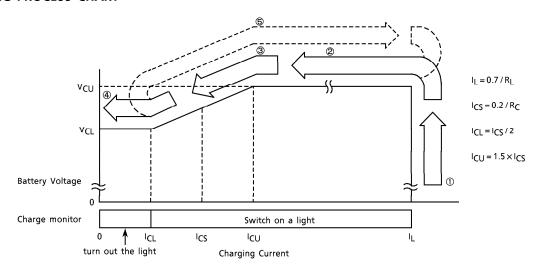
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The information contained herein is subject to change without notice.

CHARGING PROCESS CHART



ΙL	Determined by the external resistor R _L .				
ICS	Determined by the external resistor R _C .				
lCL	Almost the center between ICS and OmA.				
lcu	Almost triple of I _{CL} .				
V _{CU}	Charging Voltage. Dependent on the number of the battery cells. Refer to the				
	chart in the next page.				
V_{CL}	Fouging Voltage. Dependent on the number of the battery cells. Refer to the chart				
	in the next page.				

OPERATION

- (1) As shown in the above chart, charging starts with maximum current I_L (given by the formula 0.7 /R_L) and the battery voltage increases gradually.
- (2) When the battery voltage reaches V_{CU} (Charging Voltage), the voltage is fixed at V_{CU}, that is the constant voltage charging state. And the charging current decreases gradually.
- (3) When the charging current decreases to the point of I_{CU}, the voltage starts dropping. The voltage dropping continues until the current reaches I_{CL}, and is settled at the Focusing Voltage (V_{CL}). And the voltage dropping ratio is given by the formula (V_{CU} V_{CL})/(I_{CU} V_{CL}) and it's center is V_{CS} and I_{CS}.
- (4) The center of the voltage dropping curve is I_{CS}, which is given by the formula 0.2 (R_C: External Resistor).
- (5) LED indicates as a charging monitor during the charging current is greater than I_{CL} . When it becomes lower than I_{CL} , LED turns off for the indication of charging completion. Internal resistance is $1k\Omega$ and external resistor is needed at $V_{CC} \ge 15V$.

MAXIMUM RATINGS (Ta = 25°C)

CHARACTE	RISTIC	SYMBOL	RATING	UNIT	
Supply Voltage		Vcc	24	V	
Max. Pre-drive Out	tput Current	lout	20	mA	
Power Dissipation	TA8532P	İ	1	· w	
Power Dissipation	TA8532F	PD	0.9		
Operating Temperating	ature	T _{opr}	- 30~75	°C	
Storage Temperatu	ıre	T _{stg}	- 55∼150	°C	

RECOMMENDED OPERATING CONDITION

CHARACTERISTIC		SYMBOL	MIN.	TYP.	MAX.	UNIT
	1Cell Charge		9	_	20	>
	2Cells Charge	Vcc	9	_	20	
Power Supply	3Cells Charge		11	_	20	
Voltage	4Cells Charge		13.5		20	
	5Cells Charge		16	_	20	
	6Cells Charge		18.5	_	20	

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, $V_{CC} = 9 \sim 20V$, $Ta = 25^{\circ}C$)

CHARACTERISTIC		SYMBOL	TEST CIR- CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Power Supply Current		Icc	1	V _{CC} = 9V V _{CC} = 20V		6.7 7.0	— 10	mA
Output Current	t	lout	2		20	40	_	mA
LED Output Current		I _{LED}	3	V _{CC} = 20V, V _{LED} = 7V V _{CC} = 20V, V _{LED} = 18V	<u> </u>	6.0 16	_ _	mΑ
Limiter Output	Detection Voltage	v_{Lim}	4	_		0.7		V
Voltage Switching Detection Voltage		٧c	5	_	_	0.2	_	٧
Non-	2Cells Charge			$V_{CC} = 20V, V_{CL} = 4.550V$	-8	_	8	%
adjustment	3Cells Charge	△V _{CL}		$V_{CC} = 20V, V_{CL} = 6.825V$	-8	_	8	
Focusting	4Cells Charge		_	$V_{CC} = 20V, V_{CL} = 9.100V$	-8	_	8	
	5Cells Charge			$V_{CC} = 20V, V_{CL} = 11.375V$	-8	_	8	
Voltage Error	6Cells Charge			$V_{CC} = 20V, V_{CL} = 13.650V$	-8		8	
Non-	2Cells Charge	∆Vcu	_	$V_{CC} = 20V, V_{CU} = 4.90V$	– 10	_	10	
adjustment	3Cells Charge			$V_{CC} = 20V, \ V_{CU} = 7.35V$	– 10	_	10	
Charging	4Cells Charge			$V_{CC} = 20V, V_{CU} = 9.80V$	– 10	_	10	
	5Cells Charge			$V_{CC} = 20V, V_{CU} = 12.25V$	- 10	_	10	
Voltage Error	6Cells Charge			$V_{CC} = 20V, V_{CU} = 14.70V$	- 10	_	10	
Output Voltage Adjustment Width		Ara	_	_	- 10	_	10	%
SENSE Terminal Reverse Current		l rev	6			0.1	10	μΑ
Disable Terminal "H" Voltage		V _{DIS} H	_	_	2.0	_	_	V
Disable Terminal "L" Voltage		V _{DIS} L	_				0.8	V

STANDARD VOLTAGE ADJUSTMENT

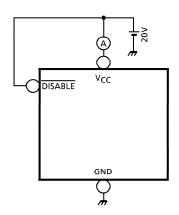
NUMBER	NUMBER V _{CL (V)} V _{CU (V)}		V _{ref} TERMINAL CONECTION	
1Cell	2.275 ± 0.025	2.45 ± 0.07	V _{ref} -ADJ	
2Cells	4.550 ± 0.050	4.90 ± 0.14	V _{ref} -SE1, ADJ	
3Cells	6.825 ± 0.075	7.35 ± 0.21	V _{ref} -SE2, ADJ	
4Cells	9.100 ± 0.100	9.80 ± 0.28	V _{ref} -SE3, ADJ	
5Cells	11.375 ± 0.125	12.25 ± 0.35	V _{ref} -SE4, ADJ	
6Cells	13.650 ± 0.150	14.70 ± 0.42	V _{ref} OPEN, ADJ	

(Note 1) The ADJ terminal is to be connected through valuable resistor and controlled.

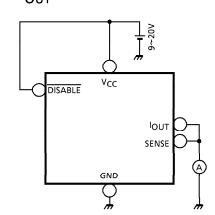
(Note 2) Adjustment is to be done in accordance with the above forcusing voltage.

TEST CIRCUIT

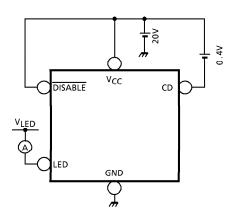
(1) I_{CC}



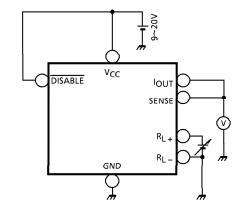
(2) I_{OUT}



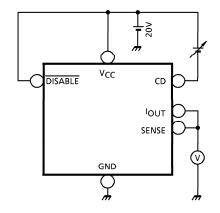
(3) I_{LED}



(4) V_{Lim}

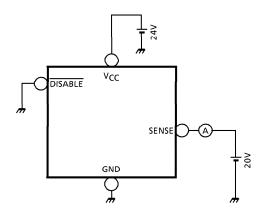


(5) V_C

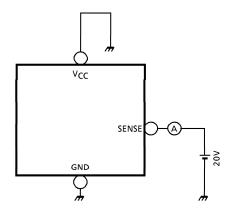


V_{CC}-CD
 V_{CH}: 0.4V
 V_{CL}: 0V

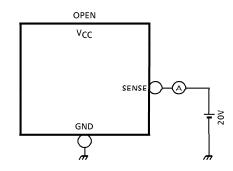
- (6) I rev
 - V_{CC} = 24V



• V_{CC} = GND

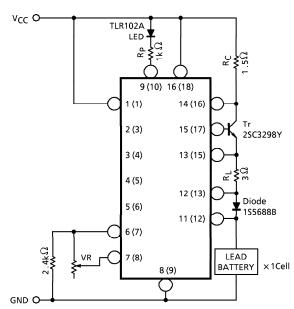


• V_{CC} = OPEN

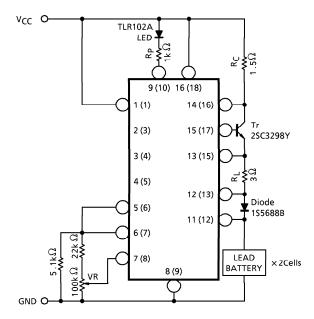


APPLICATION

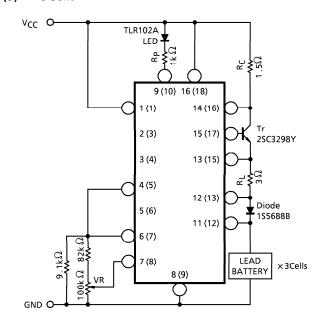




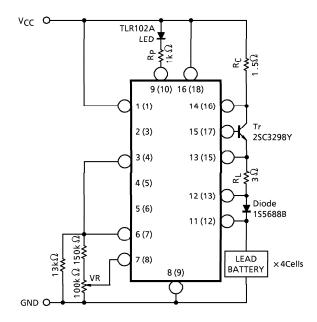
(2) 2Cells



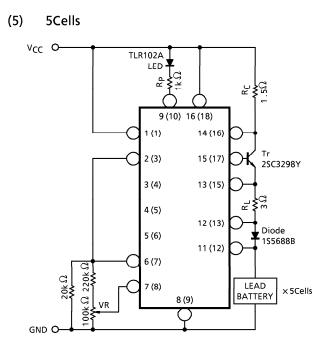
(3) 3Cells

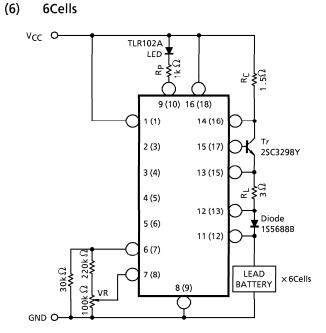


(4) 4Cells

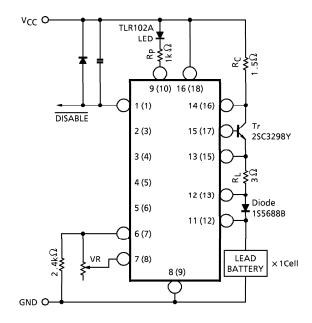


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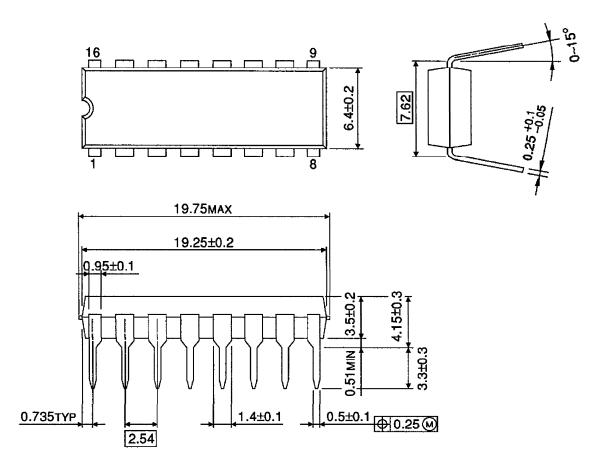
(7) DISABLE (ex. 1Cell)



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OUTLINE DRAWING

DIP16-P-300-2.54A Unit: mm



Weight: 1.0g (Typ.)

Weight: 0.5g (Typ.)