Projet 7 - BOOST110 / Hacheur élévateur de type BOOST 24V / 110V-80mA

Projet : IUT3

Info : [DIV424]

Révision : 1 du samedi 14 février 2004

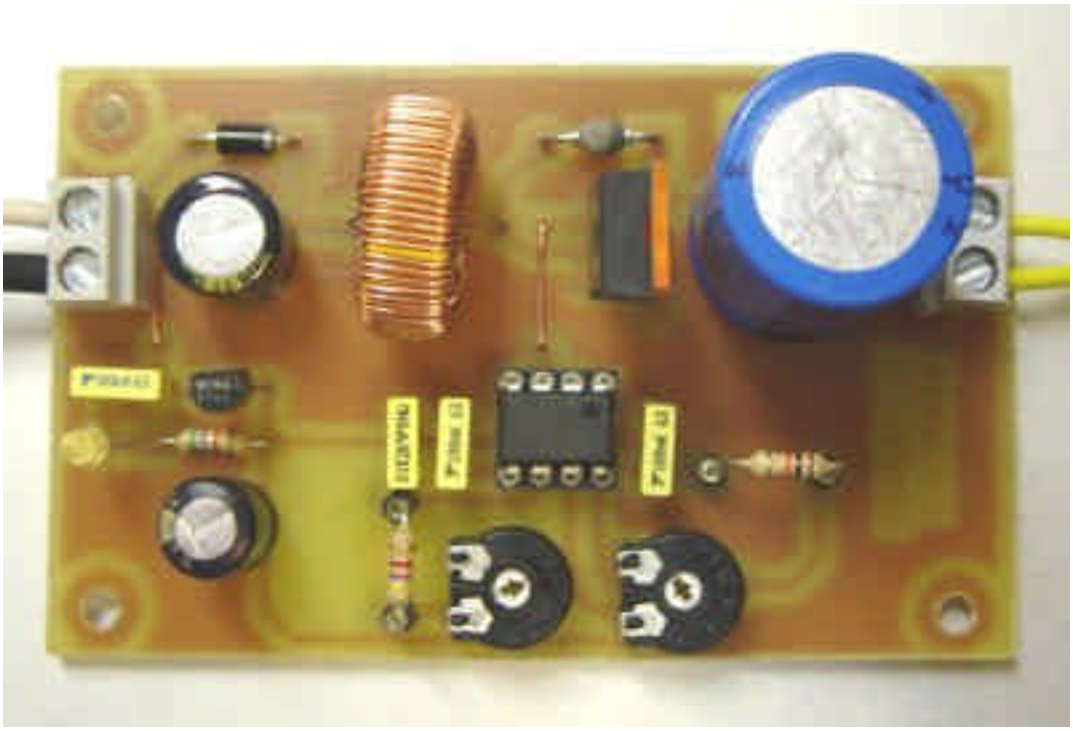


Fig. 7.1. Maquette (images-maquettes\boost110-12.jpg).

7.1 Liste des documents

- Prix du montage.
- Schéma électronique.
- Circuit imprimé coté cuivre.
- Circuit imprimé coté composants.
- Implantation des composants.
- Documentations.

7.2 Désignation des composants

Tableau 7.1. Liste de composants (projets-iut3.xls / BOOST110).

No	Quantité	Référence	Désignation	Empreinte
1	1	C1	100uF 63V	RADIAL06
2	1	C2	47uF 400V	RADIAL13
3	1	C3	CAPA POL	RADIAL06
4	4	C5,C6,C7,C9	100nF	CK06
5	1	D1	BYV95C	DO41
6	1	D2	1N4001	DO41
7	1	D3	BZT03C150	DO41
8	1	D4	3mm 2mA	LED3
9	1	JP1	+110V	02PL2
10	1	JP2	24V	02PL2
11	1	L1	300uH 2A	WE300
12	1	REG1	78L15	TO92
13	1	R2	6.8k	RC04L
14	2	R3,R6	10k	RC04L
15	2	R8,R9	10k AJ	RAJ1
16	1	T1	IRF840	TO220
17	1	U2	NE555	08DIP300L

7.3 Allure des principaux composants

Fig. 7.2. Bornier CANDEM 3 points (images-composants\bornier1.jpg).

Fig. 7.3. Inductance série WE-FI Würth Elektronik (images-composants\WE300FI.jpg).

7.4 Simulations avec Psim Simcad ver 5.0 demo

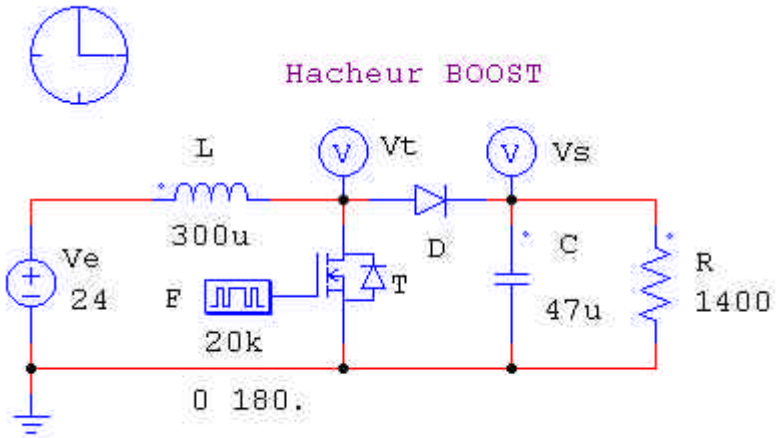


Fig. 7.4. Schéma utilisé pour la simulation (orcad\iut3\boost110\psim\boost-1a.sch).

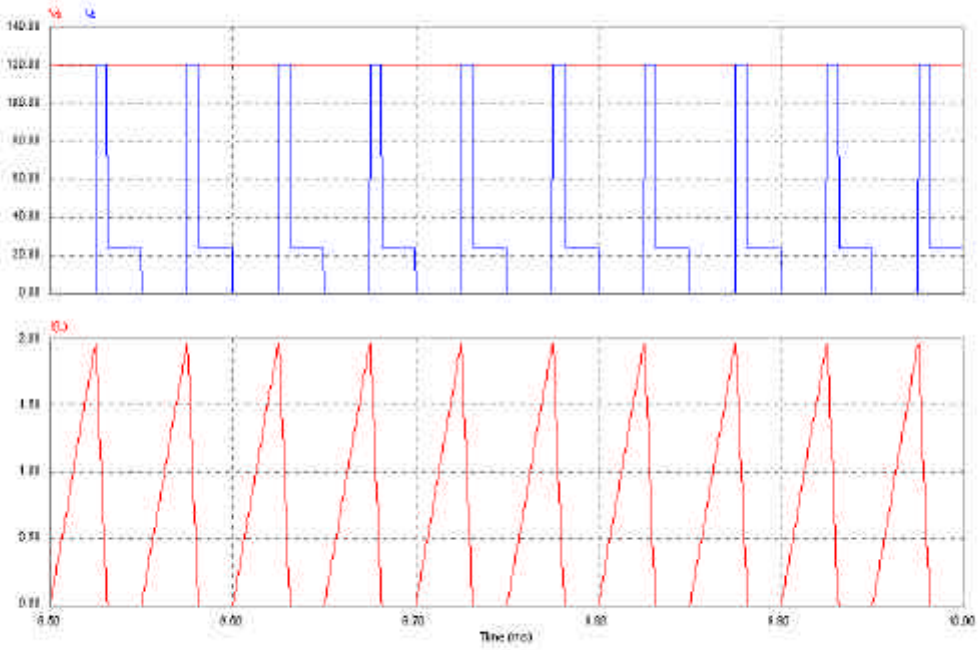
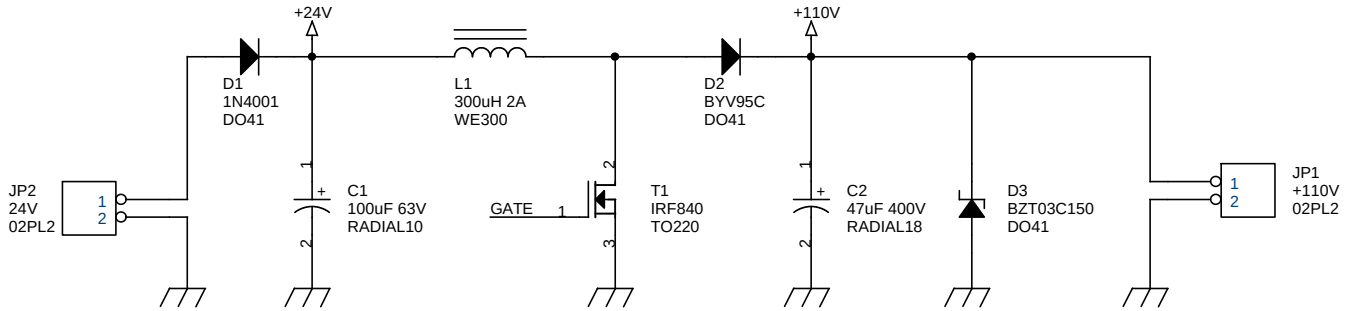
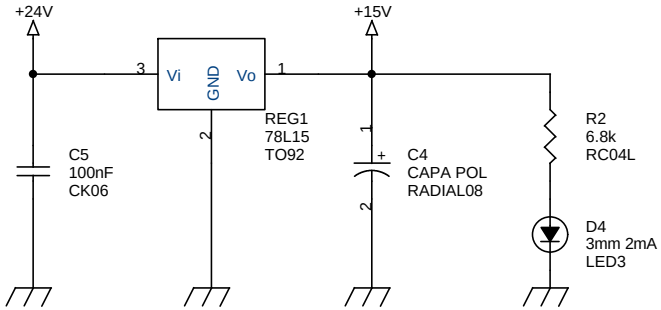
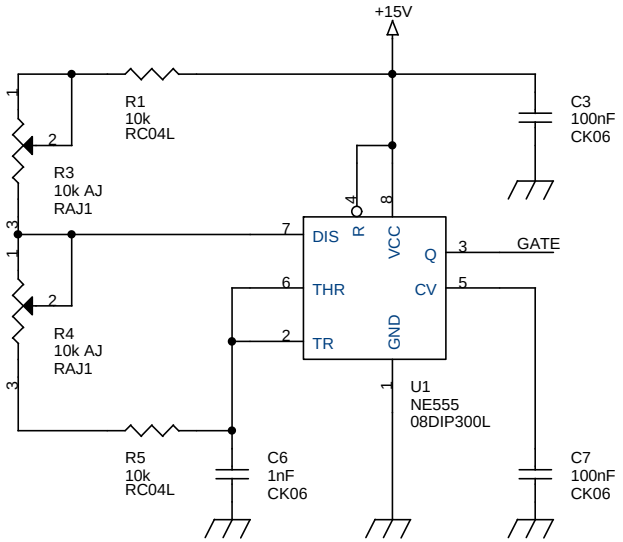
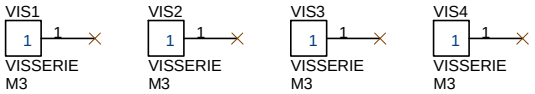


Fig. 7.5. Résultats de la simulation (orcad\iut3\boost110\psim\boost-1a.sch).

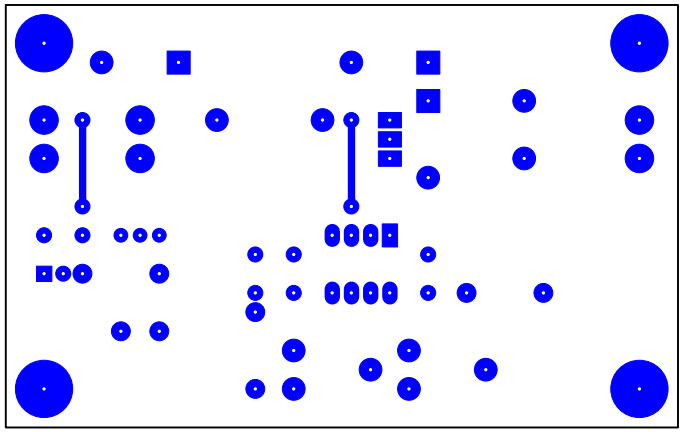


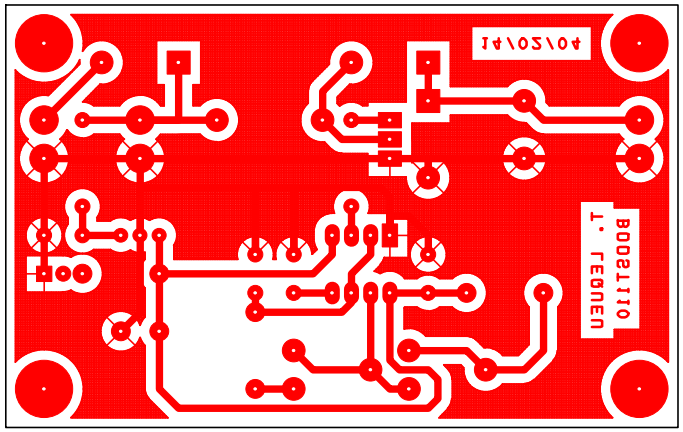






Title: Hacheur élévateur de type BOOST 24V / 110V-80mA		
Size: A4	Document Number: Projet IUT3 / [DIV424] / BOOST110	Rev: 1
Date: Saturday, February 14, 2004	Sheet 1 of 1	

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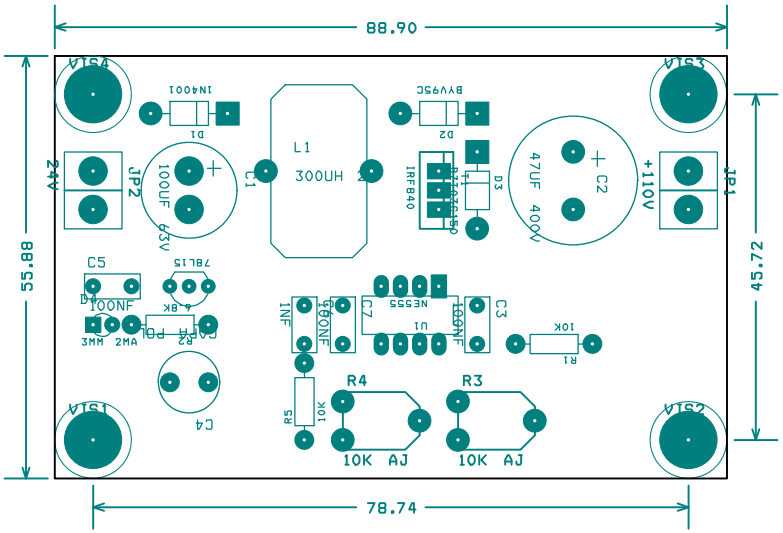
88.90
55.88
45.72
78.74
24V
JP2
100UF 63V
C1
L1
300UH
IN4001
D1
BYV95C
D2
IRF840
D3
47UF 400V
C2
+110V
JP1
ISIA
C5
100NF
7BL15
4.8K
3MM
2MA
R2
C4
INF
C7
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U1
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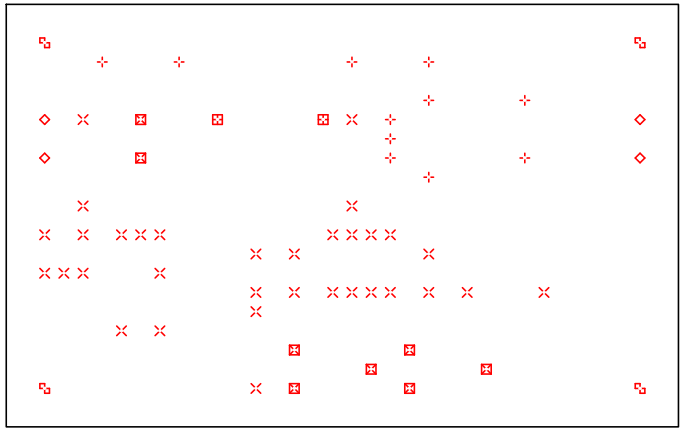
R1
R4
R3
R5
10K
10K AJ
10K AJ

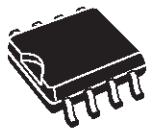


DRILL CHART				
SYM	DIAM	TOL	QTY	NOTE
×	0.787 mm		33	
+	0.991 mm		11	
◇	1.000 mm		4	
⊠	1.194 mm		8	
⊞	1.499 mm		2	
⧉	3.200 mm		4	
TOTAL			62	

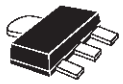
L78L00 SERIES

POSITIVE VOLTAGE REGULATORS

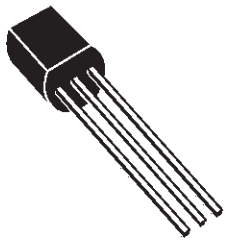
- OUTPUT CURRENT UP TO 100 mA
- OUTPUT VOLTAGES OF 3.3; 5; 6; 8; 9; 12; 15; 18; 24V
- THERMAL OVERLOAD PROTECTION
- SHORT CIRCUIT PROTECTION
- NO EXTERNAL COMPONENTS ARE REQUIRED
- AVAILABLE IN EITHER ± 5% (AC) OR ± 10% (C) SELECTION



SO-8



SOT-89



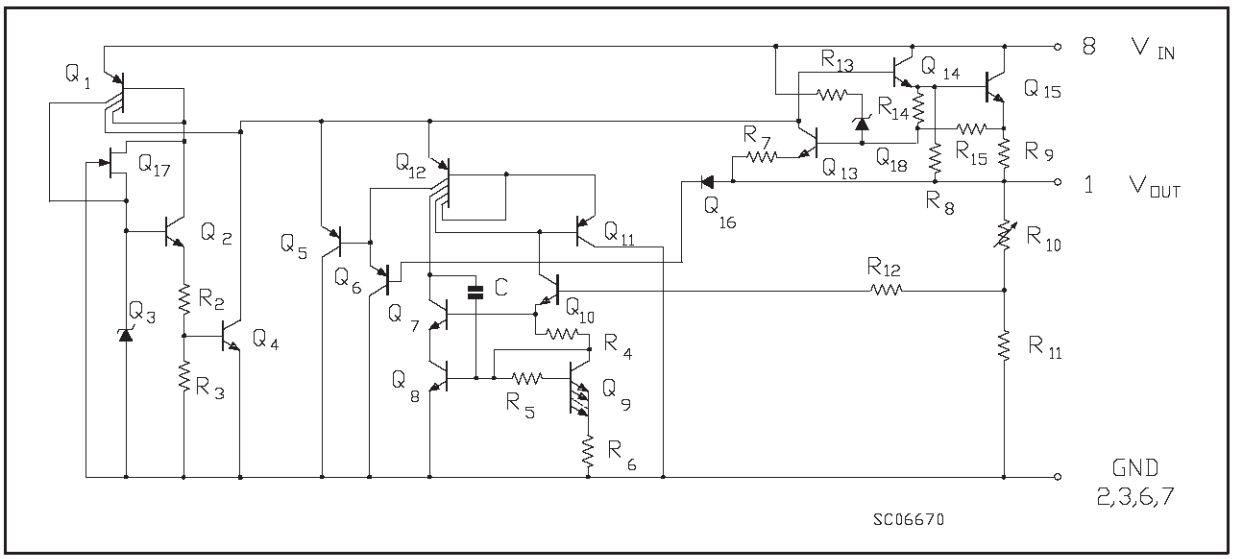
TO-92

DESCRIPTION

The L78L00 series of three-terminal positive regulators employ internal current limiting and thermal shutdown, making them essentially indestructible. If adequate heatsink is provided, they can deliver up to 100 mA output current. They are intended as fixed voltage regulators in a wide range of applications including local or on-card regulation for elimination of noise and distribution problems associated with single-point regulation. In addition, they can be used with power pass elements to make high-current voltage regulators.

The L78L00 series used as Zener diode/resistor combination replacement, offers an effective output impedance improvement of typically two orders of magnetude, along with lower quiescent current and lower noise.

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATING

Symbol	Parameter		Value	Unit
V_i	DC Input Voltage	V_o = 3.3 V to 9 V	30	V
		V_o = 12 V to 15 V	35	V
		V_o = 18 V to 24 V	40	V
I_o	Output Current		100	mA
P_{tot}	Power Dissipation		Internally limited (*)	
T_{stg}	Storage Temperature Range		- 40 to 150	^oC
T_{op}	Operating Junction Temperature RangeFor L78L00C, L78L00AC For L78L00AB		0 to 125 - 40 to 125	^oC ^oC

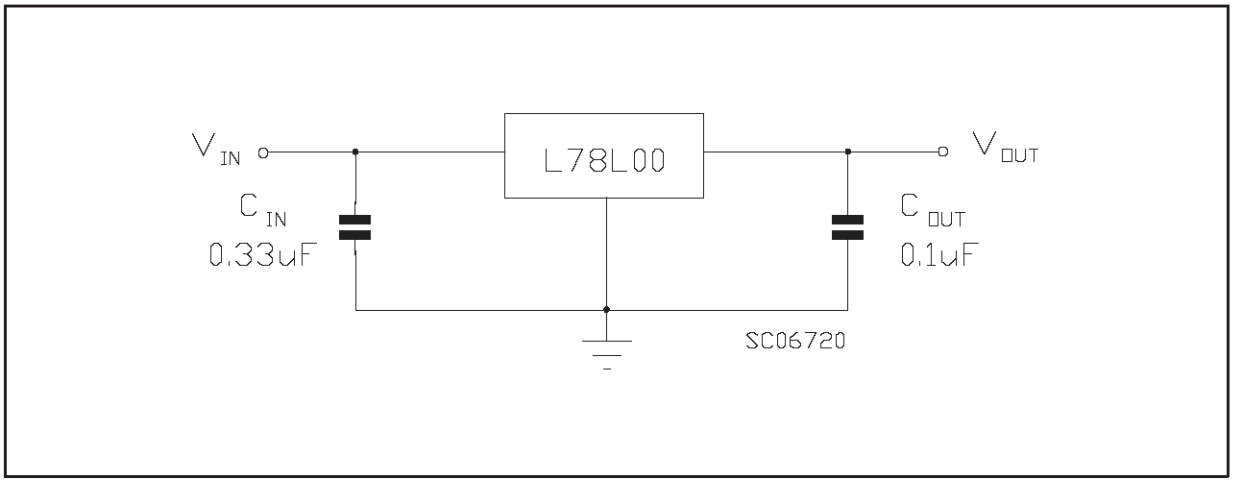
(*) Our SO-8 package used for Voltage Regulators is modified internally to have pins 2, 3, 6 and 7 electrically commoned to the die attach flag. This particular frame decreases the total thermal resistance of the package and increases its ability to dissipate power when an appropriate area of copper on the printed circuit board is available for heatsinking. The external dimensions are the same as for the standard SO-8

THERMAL DATA

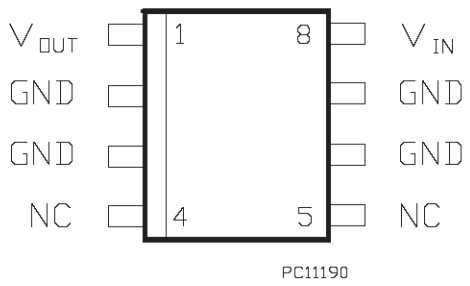
Symbol	Parameter		SO-8	TO-92	SOT-89	Unit
$R_{thj\text{-}case}$	Thermal Resistance Junction-case	Max	20		15	$^oC/W$
$R_{thj\text{-}amb}$	Thermal Resistance Junction-ambient	Max	55 (*)	200		$^oC/W$

(*) Considering 6cm^2 of copper Board heat-sink

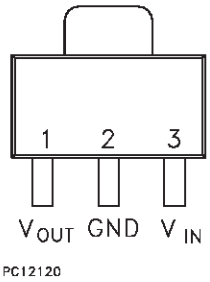
TEST CIRCUITS



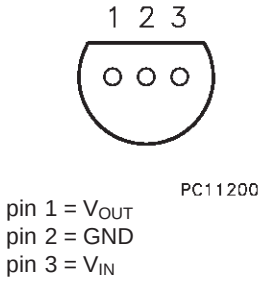
CONNECTION DIAGRAM AND ORDERING NUMBERS (top view)



SO-8



SOT-89



TO-92

BOTTOM VIEW

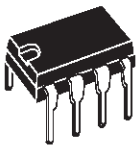
ORDERING NUMBERS

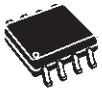
Type	SO-8	TO-92	SOT-89 (T&R)	Output Voltage
L78L33AC	L78L33ACD	L78L33ACZ	L78L33ACUTR	3.3 V
L78L33AB	L78L33ABD	L78L33ABZ	L78L33ABUTR	3.3 V
L78L05C	L78L05CD	L78L05CZ		5 V
L78L05AC	L78L05ACD	L78L05ACZ	L78L05ACUTR	5 V
L78L05AB	L78L05ABD	L78L05ABZ	L78L05ABUTR	5 V
L78L06C	L78L06CD	L78L06CZ		6 V
L78L06AC	L78L06ACD	L78L06ACZ	L78L06ACUTR	6 V
L78L06AB	L78L06ABD	L78L06ABZ	L78L06ABUTR	6 V
L78L08C	L78L08CD	L78L08CZ		8 V
L78L08AC	L78L08ACD	L78L08ACZ	L78L08ACUTR	8 V
L78L08AB	L78L08ABD	L78L08ABZ	L78L08ABUTR	8 V
L78L09C	L78L09CD	L78L09CZ		9 V
L78L09AC	L78L09ACD	L78L09ACZ	L78L09ACUTR	9 V
L78L09AB	L78L09ABD	L78L09ABZ	L78L09ABUTR	9 V
L78L12C	L78L12CD	L78L12CZ		12 V
L78L12AC	L78L12ACD	L78L12ACZ	L78L12ACUTR	12 V
L78L12AB	L78L12ABD	L78L12ABZ	L78L12ABUTR	12 V
L78L15C	L78L15CD	L78L15CZ		15 V
L78L15AC	L78L15ACD	L78L15ACZ	L78L15ACUTR	15 V
L78L15AB	L78L15ABD	L78L15ABZ	L78L15ABUTR	15 V
L78L18C	L78L18CD	L78L18CZ		18 V
L78L18AC	L78L18ACD	L78L18ACZ	L78L18ACUTR	18 V
L78L18AB	L78L18ABD	L78L18ABZ	L78L18ABUTR	18 V
L78L24C	L78L24CD	L78L24CZ		24 V
L78L24AC	L78L24ACD	L78L24ACZ	L78L24ACUTR	24 V
L78L24AB	L78L24ABD	L78L24ABZ	L78L24ABUTR	24 V

NE555
SA555 - SE555

GENERAL PURPOSE SINGLE BIPOLAR TIMERS

- LOW TURN OFF TIME
- MAXIMUM OPERATING FREQUENCY GREATER THAN 500kHz
- TIMING FROM MICROSECONDS TO HOURS
- OPERATES IN BOTH ASTABLE AND MONOSTABLE MODES
- HIGH OUTPUT CURRENT CAN SOURCE OR SINK 200mA
- ADJUSTABLE DUTY CYCLE
- TTL COMPATIBLE
- TEMPERATURE STABILITY OF 0.005% PER^{O}C





N
DIP8
(Plastic Package)

D
SO8
(Plastic Micropackage)

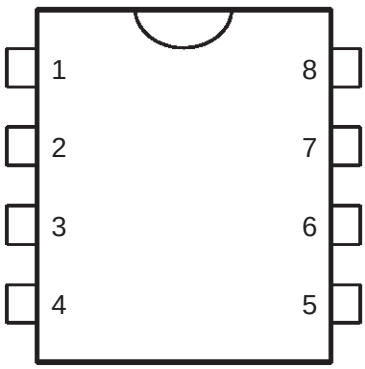
DESCRIPTION

The NE555 monolithic timing circuit is a highly stable controller capable of producing accurate time delays or oscillation. In the time delay mode of operation, the time is precisely controlled by one external resistor and capacitor. For a stable operation as an oscillator, the free running frequency and the duty cycle are both accurately controlled with two external resistors and one capacitor. The circuit may be triggered and reset on falling waveforms, and the output structure can source or sink up to 200mA. The NE555 is available in plastic and ceramic minidip package and in a 8-lead micropackage and in metal can package version.

ORDER CODES

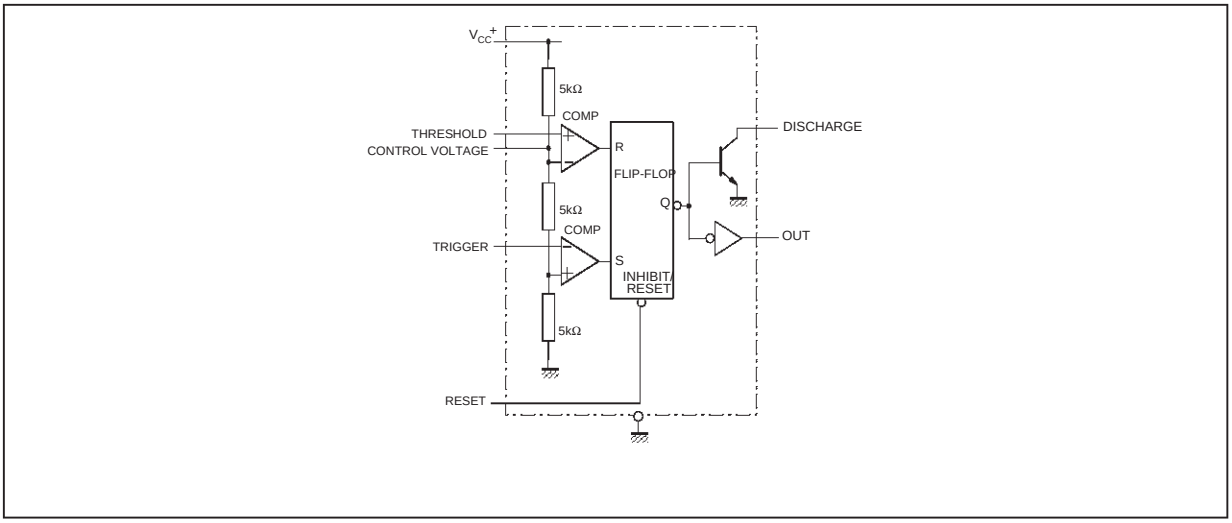
Part Number	Temperature Range	Package	
		N	D
NE555	0^{o}C, 70^{o}C	•	•
SA555	–40^{o}C, 105^{o}C	•	•
SE555	–55^{o}C, 125^{o}C	•	•

PIN CONNECTIONS (top view)

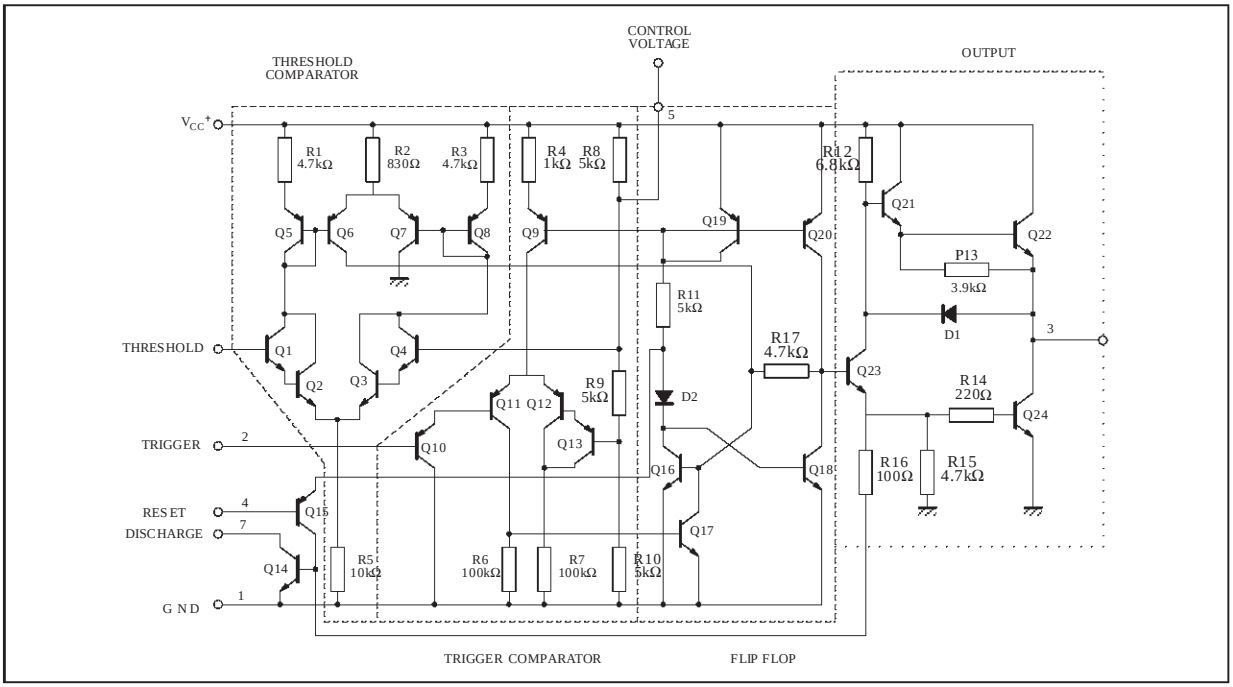


1 - GND
2 - Trigger
3 - Output
4 - Reset
5 - Control voltage
6 - Threshold
7 - Discharge
8 - V_{CC}

BLOCK DIAGRAM



SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

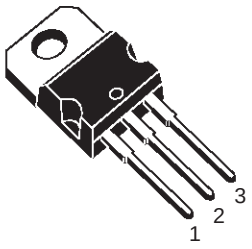
Symbol	Parameter	Value	Unit
V_{cc}	Supply Voltage	18	V
T_{oper}	Operating Free Air Temperature Range for NE555 for SA555 for SE555	0 to 70 –40 to 105 –55 to 125	°C
T_j	Junction Temperature	150	°C
T_{stg}	Storage Temperature Range	–65 to 150	°C

IRF840

N - CHANNEL 500V - 0.75Ω - 8A - TO-220 PowerMESH™ MOSFET

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
IRF840	500 V	< 0.85 Ω	8 A

- TYPICAL $R_{DS(on)}$ = 0.75 Ω
- EXTREMELY HIGH dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- VERY LOW INTRINSIC CAPACITANCES
- GATE CHARGE MINIMIZED



TO-220

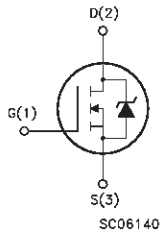
DESCRIPTION

This power MOSFET is designed using the company's consolidated strip layout-based MESH OVERLAY™ process. This technology matches and improves the performances compared with standard parts from various sources.

APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- SWITH MODE POWER SUPPLIES (SMPS)
- DC-AC CONVERTERS FOR WELDING EQUIPMENT AND UNINTERRUPTIBLE POWER SUPPLIES AND MOTOR DRIVER

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage (V_{GS} = 0)	500	V
V_{DGR}	Drain- gate Voltage (R_{GS} = 20 kΩ)	500	V
V_{GS}	Gate-source Voltage	± 20	V
I_D	Drain Current (continuous) at T_c = 25 °C	8.0	A
I_D	Drain Current (continuous) at T_c = 100 °C	5.1	A
I_{DM}(•)	Drain Current (pulsed)	32	A
P_{tot}	Total Dissipation at T_c = 25 °C	125	W
	Derating Factor	1.0	W/°C
dv/dt(1)	Peak Diode Recovery voltage slope	3.5	V/ns
T_{stg}	Storage Temperature	-65 to 150	°C
T_j	Max. Operating Junction Temperature	150	°C

(•) Pulse width limited by safe operating area (1) I_{SD} ≤ 8A, di/dt ≤ 100 A/µs, V_{DD} ≤ $V_{(BR)DSS}$, Tj ≤ T_{JMAX}

First Digit of the Datecode Being Z or K Identifies Silicon Characterized in this Datasheet

Fast soft-recovery controlled avalanche rectifiers

BYV95 series

FEATURES

- Glass passivated
- High maximum operating temperature
- Low leakage current
- Excellent stability
- Guaranteed avalanche energy absorption capability
- Available in ammo-pack.

DESCRIPTION

Rugged glass SOD57 package, using a high temperature alloyed construction. This package is hermetically sealed and fatigue free as coefficients of expansion of all used parts are matched.

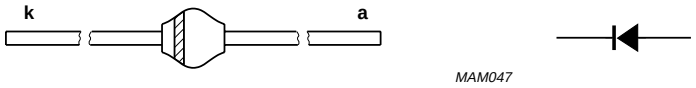


Fig.1 Simplified outline (SOD57) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage				
	BYV95A		–	200	V
	BYV95B		–	400	V
	BYV95C		–	600	V
V_R	continuous reverse voltage				
	BYV95A		–	200	V
	BYV95B		–	400	V
	BYV95C		–	600	V
$I_{F(AV)}$	average forward current	T_{tp} = 65 °C; lead length = 10 mm see Fig. 2; averaged over any 20 ms period; see also Fig. 6	–	1.5	A
		T_{amb} = 65 °C; PCB mounting (see Fig.11); see Fig. 3; averaged over any 20 ms period; see also Fig. 6	–	0.8	A
I_{FRM}	repetitive peak forward current	T_{tp} = 65 °C; see Fig. 4	–	17	A
		T_{amb} = 65 °C; see Fig. 5	–	9	A
I_{FSM}	non-repetitive peak forward current	t = 10 ms half sine wave; $T_j = T_{j\,max}$ prior to surge; $V_R = V_{RRMmax}$	–	35	A
E_{RSM}	non-repetitive peak reverse avalanche energy	L = 120 mH; $T_j = T_{j\,max}$ prior to surge; inductive load switched off	–	10	mJ
T_{stg}	storage temperature		–65	+175	°C
T_j	junction temperature	see Fig. 7	–65	+175	°C

ELECTRICAL CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_F	forward voltage	I_F = 3 A; $T_j = T_{j\,max}$; see Fig. 8	–	–	1.35	V
		I_F = 3 A; see Fig. 8	–	–	1.60	V
$V_{(BR)R}$	reverse avalanche breakdown voltage	I_R = 0.1 mA				
	BYV95A		300	–	–	V
	BYV95B		500	–	–	V
	BYV95C		700	–	–	V
I_R	reverse current	$V_R = V_{RRMmax}$; see Fig. 9	–	–	1	µA
		$V_R = V_{RRMmax}$; T_j = 165 °C; see Fig. 9	–	–	150	µA
t_{rr}	reverse recovery time	when switched from I_F = 0.5 A to I_R = 1 A; measured at I_R = 0.25 A; see Fig. 12	–	–	250	ns
C_d	diode capacitance	f = 1 MHz; V_R = 0 V; see Fig. 10	–	45	–	pF
$\left\|\frac{dI_R}{dt}\right\|$	maximum slope of reverse recovery current	when switched from I_F = 1 A to $V_R \geq 30$ V and $dI_F/dt = -1$ A/µs; see Fig.13	–	–	7	A/µs

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\,j\text{-}tp}$	thermal resistance from junction to tie-point	lead length = 10 mm	46	K/W
$R_{th\,j\text{-}a}$	thermal resistance from junction to ambient	note 1	100	K/W

Note

1. Device mounted on an epoxy-glass printed-circuit board, 1.5 mm thick; thickness of Cu-layer ≥40 µm, see Fig.11. For more information please refer to the *"General Part of associated Handbook"*.