

## Projet 12 - HACHEUR2 / Hacheur et sa commande.

Projet : IUT2  
Info : [DATA157]  
Révision : 19 septembre 2000

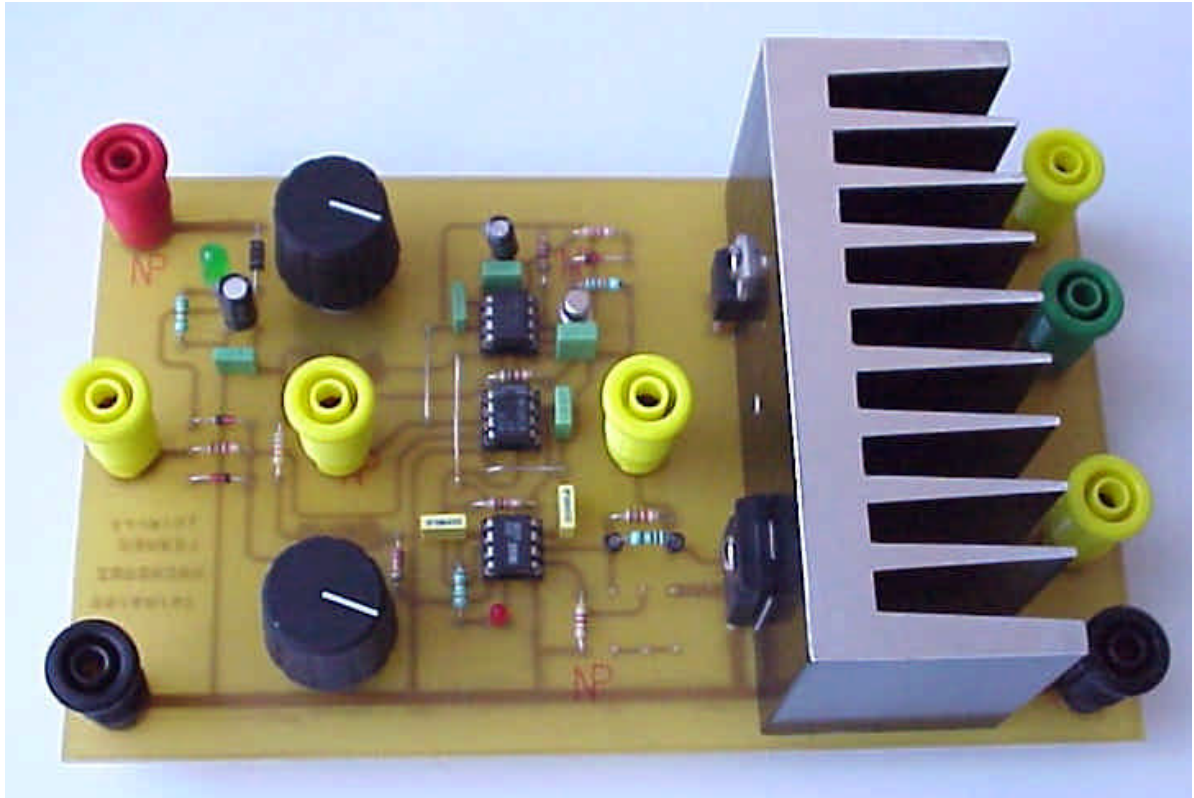


Figure 12.1. Hacheur et sa commande (images-maquettes\hacheur2-1.jpg).

### 12.1 Liste des documents

- Usinage du radiateur
- Désignation des composants
- Prix du montage.
- Schéma électronique.
- Circuit imprimé coté cuivre.
- Circuit imprimé coté composants.
- Implantation des composants.
- Documentations : IRFP350, BYT 08P-400, NE555, LM311, IR2122.

## 12.2 Usinage du radiateur

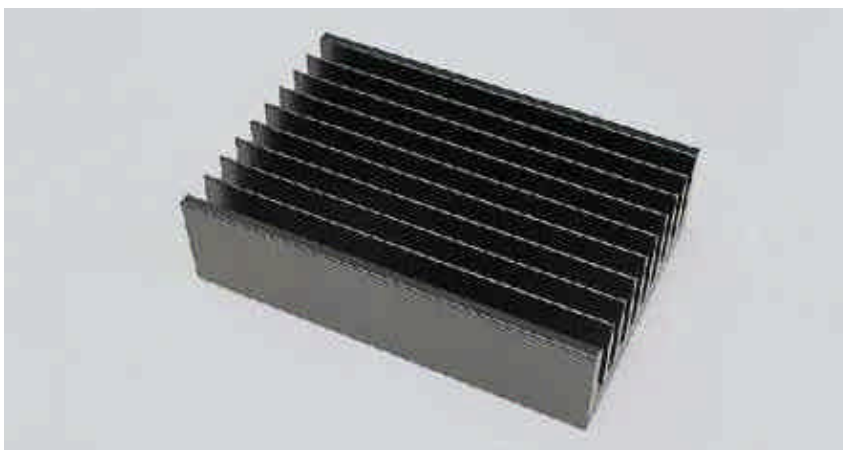


Figure 12.2. Radiateur de type SK92, longueur 150 mm (images-composants\sk92.jpg).

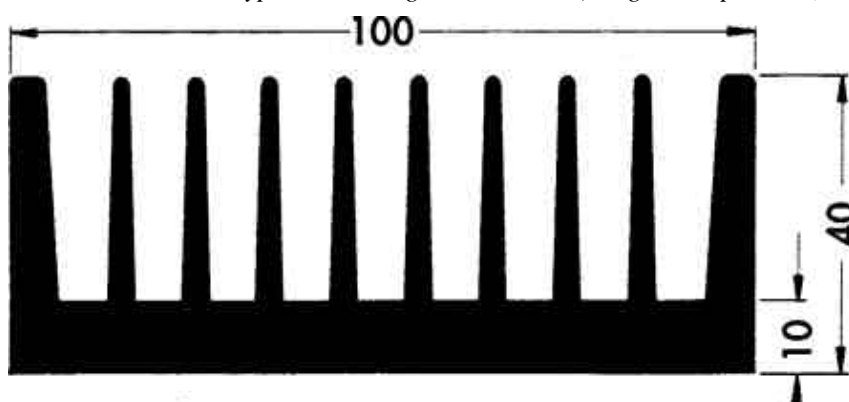


Figure 12.3. Dimensions du radiateur SK92 (images-composants\sk92.gif).

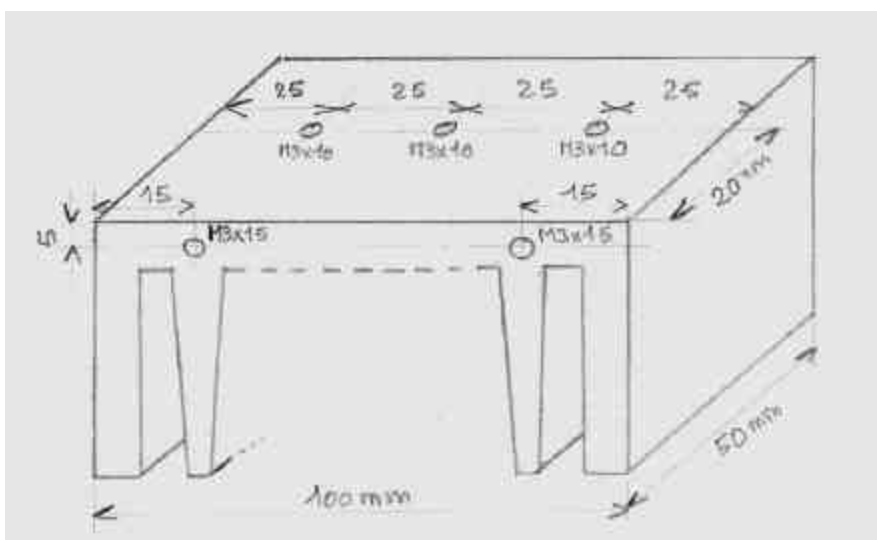


Figure 12.4. Découpe et perçage du radiateur (orcad\Imp1\ra\_h21.jpg).

## 12.3 Désignation des composants

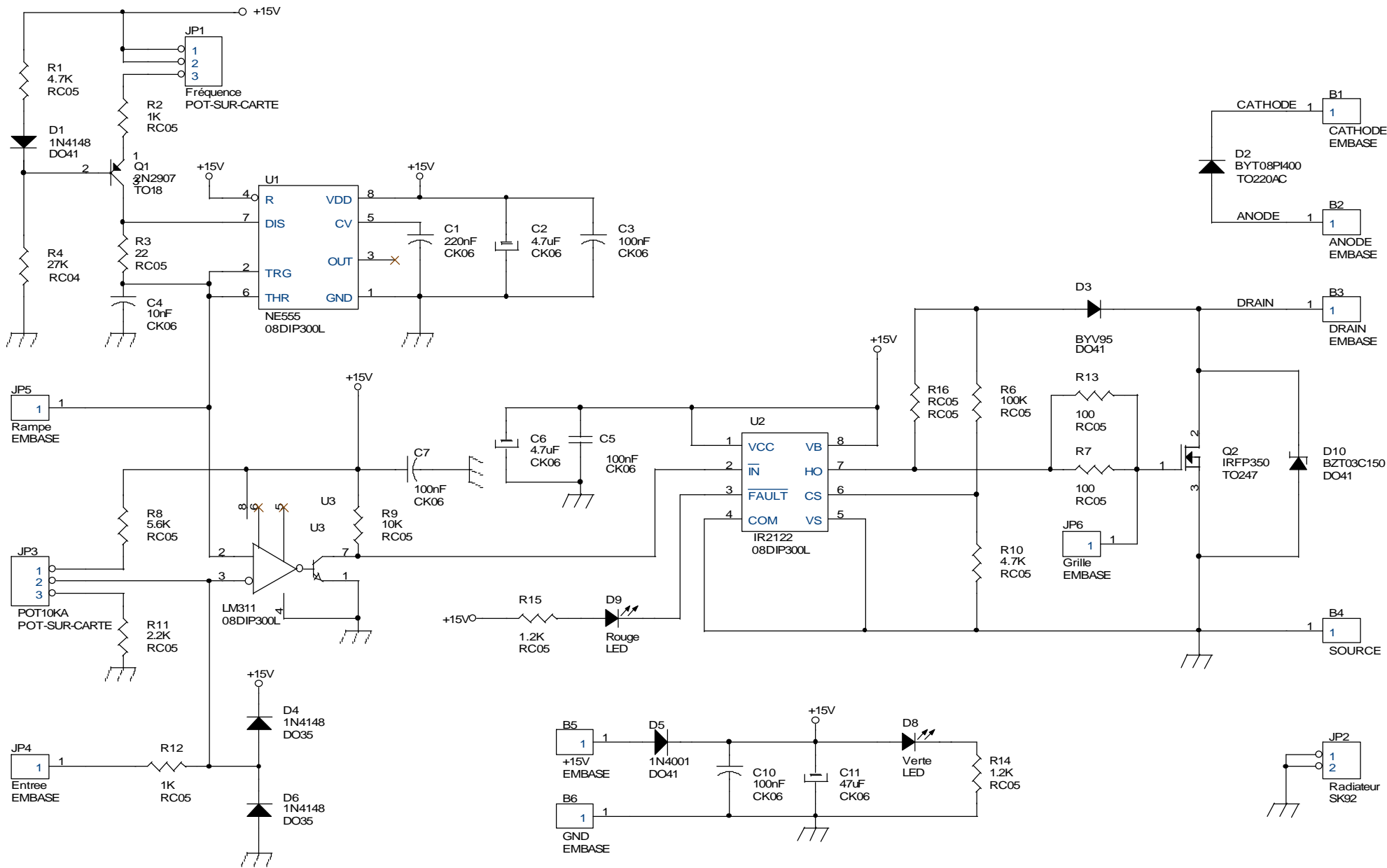
Tableau 12.1. Liste de composants (projets-iut2.xls / HACHEUR2).

N°	Quantité	Référence	Désignation	PCB Footprint
1	1	B1	CATHODE	EMBASE
2	1	B2	ANODE	EMBASE
3	1	B3	DRAIN	EMBASE
4	1	B4	SOURCE	EMBASE
5	1	B5	+15V	EMBASE
6	1	B6	GND	EMBASE
7	1	C1	220nF	CK06
8	2	C2,C6	4.7uF	CK06
9	4	C3,C5,C7,C10	100nF	CK06
10	1	C4	10nF	CK06
11	1	C11	47uF	CK06
12	1	D1	1N4148	DO41
13	1	D2	DIODE	TO220AC
14	1	D3	BYV95	DO41
15	2	D6,D4	1N4148	DO35
16	1	D5	1N4001	DO41
17	1	D8	Verte	LED
18	1	D9	Rouge	LED
19	1	D10	BZT03C150	DO41
20	1	JP1	10KA (Fréquence)	POT-SUR-CARTE
21	1	JP2	Radiateur	SK92
22	1	JP3	10KA (Alpha)	POT-SUR-CARTE
23	1	JP4	Entrée	EMBASE
24	1	JP5	Rampe	EMBASE
25	1	JP6	Grille	EMBASE
26	1	Q1	2N2907	TO18
27	1	Q2	IRFP350	TO247
28	2	R1,R10	4.7K	RC05
29	2	R12,R2	1K	RC05
30	1	R3	22	RC05
31	1	R4	27K	RC04
32	1	R6	100K	RC05
33	2	R13,R7	100	RC05
34	1	R8	5.6K	RC05
35	1	R9	10K	RC05
36	1	R11	2.2K	RC05
37	2	R14,R15	1.2K	RC05
38	1	R16	RC05	RC05
39	1	U1	NE555	08DIP300L
40	1	U2	IR2122	08DIP300L
41	1	U3	LM311	08DIP300L

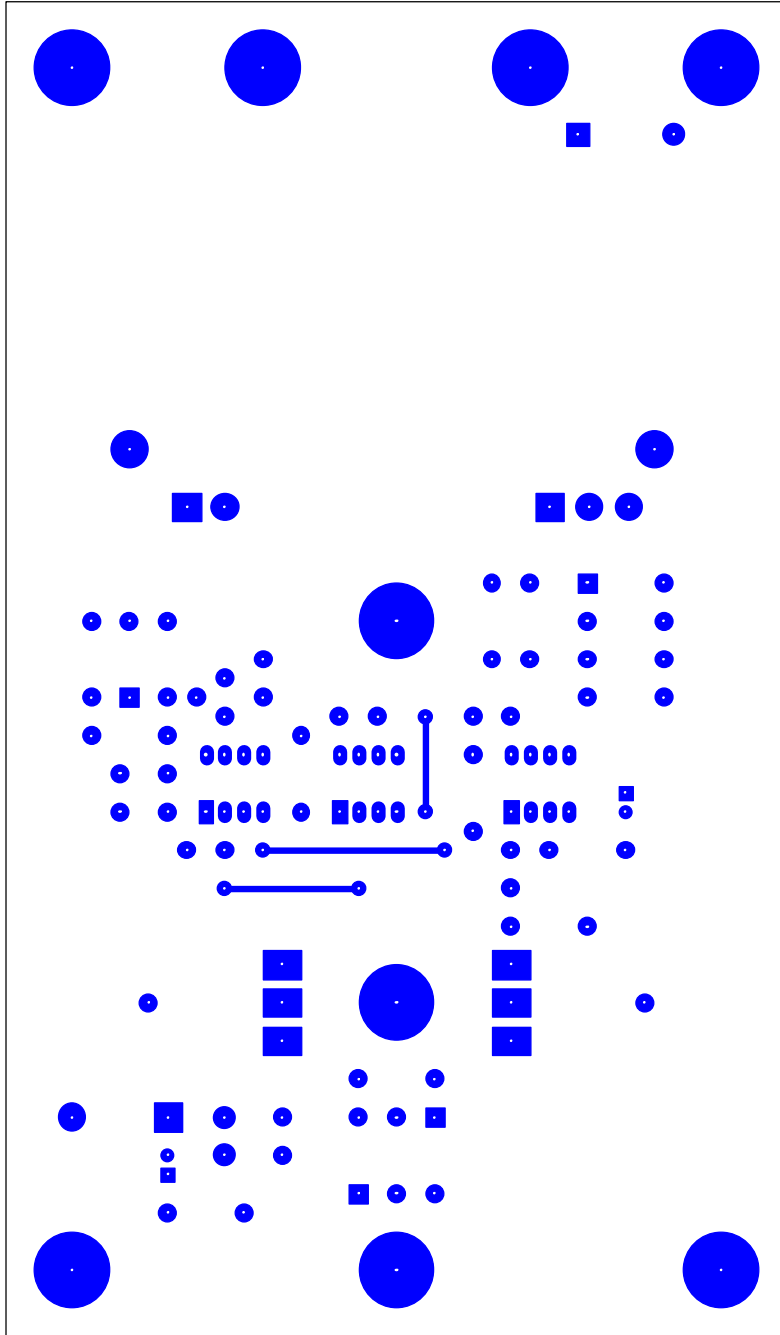
**Hacheur et sa commande****Revised: Tuesday, March 12, 2002****IUT2 / HACHEUR2 / [DATA157]****Revision: 6**

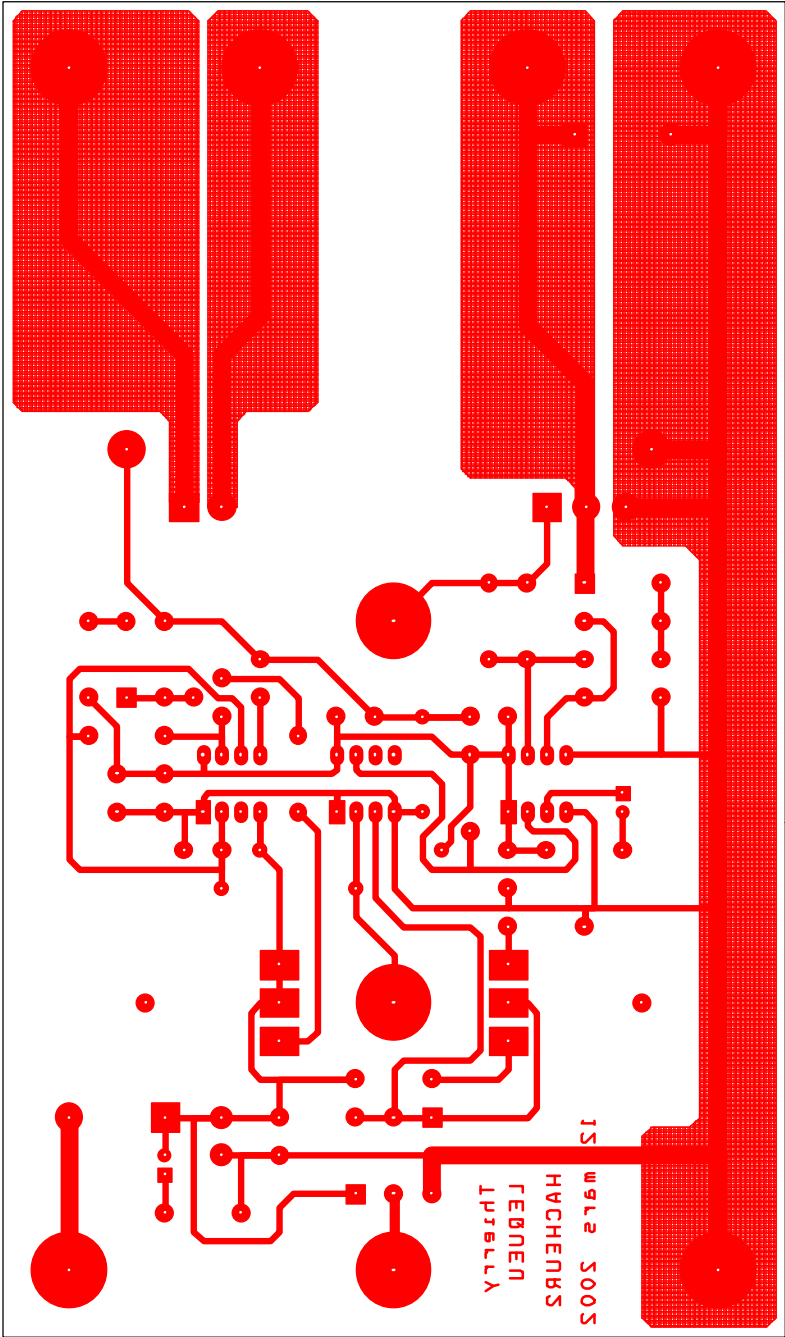
Référence	Qu.	Désignation	Fournisseur	Date	Code Cde.	U.d. v	Prix U.	Prix T.
B5	1	Douille double isolation à visser rouge	Radiospares	20-avr-02	230-6344	1	, €	, €
B4, B6	2	Douille double isolation à visser noire	Radiospares	20-avr-02	230-6350	1	, €	, €
B7	1	Douille double isolation à visser bleue	Radiospares	20-avr-02	230-6366	1	, €	, €
B1, B3, JP4, JP5, JP6	5	Douille double isolation à visser jaune	Radiospares	20-avr-02	230-6372	1	, €	, €
B2	1	Douille double isolation à visser verte	Radiospares	20-avr-02	230-6388	1	, €	, €
C1	1	220nF MKT 63V	Radiospares	20-avr-02	166-8360	10	, €	, €
C2, C6	2	. uF V série M	Radiospares	20-avr-02	228-6868	5	, €	, €
C3, C5, C7, C10	4	100nF MKT 63V	Radiospares	20-avr-02	166-8348	10	, €	, €
C4	1	10nF MKT 400V	Radiospares	20-avr-02	166-5901	10	, €	, €
C11	1	. uF V série M	Radiospares	20-avr-02	228-6751	5	, €	, €
D5	2	1N4001	Radiospares	20-avr-02	261-148	10	, €	, €
D1, D6, D4	3	1N4148	Radiospares	20-avr-02	271-606	10	, €	, €
D4	1	BZT03C150	Radiospares	20-avr-02	112-4371	3	, €	, €
D5, D6, D7	3	Diode BYT 08PI-400	Radiospares	20-avr-02	251-3160	1	, €	, €
D8	1	LED verte 5 mm	Radiospares	20-avr-02	590-446	10	, €	, €
D9	1	LED rouge 3 mm	Radiospares	20-avr-02	171-1234	10	, €	, €
JP1, JP3	2	Potentiomètre KA	Radiospares	20-avr-02	387-414	1	, €	, €
JP2	0,3	Radiateur SK92 150 SA	Radiospares	20-avr-02	169-4252	1	, €	, €
Q1	1	2N2907	Radiospares	20-avr-02	349-9043	5	, €	, €
Q2	1	IRFP350	Radiospares	20-avr-02	177-3535	1	, €	, €
R1, R10	2	4.7K	IUT GEII			1	, €	, €
R12, R2	2	1K	IUT GEII			1	, €	, €
R3	1	22	IUT GEII			1	, €	, €
R4	1	27K	IUT GEII			1	, €	, €
R6	1	100K	IUT GEII			1	, €	, €
R13, R7	2	100	IUT GEII			1	, €	, €
R8	1	5.6K	IUT GEII			1	, €	, €
R9	1	10K	IUT GEII			1	, €	, €
R11	1	2.2K	IUT GEII			1	, €	, €
R14, R15	2	1.2K	IUT GEII			1	, €	, €
R16	1	RC05	IUT GEII			1	, €	, €
U1	1	NE555	Radiospares	20-avr-02	305-478	1	, €	, €
U2	1	IR2122	Radiospares	20-avr-02	357-2902	1	, €	, €
U3	1	LM311	Radiospares	20-avr-02	308-843	1	, €	, €
Divers	3	Support 8 broches	Radiospares	20-avr-02	100-9935	10	, €	, €
Divers	171	Circuit imprimé SF	Radiospares	20-avr-02	159-6091	600	, €	, €
Divers						1	, €	, €

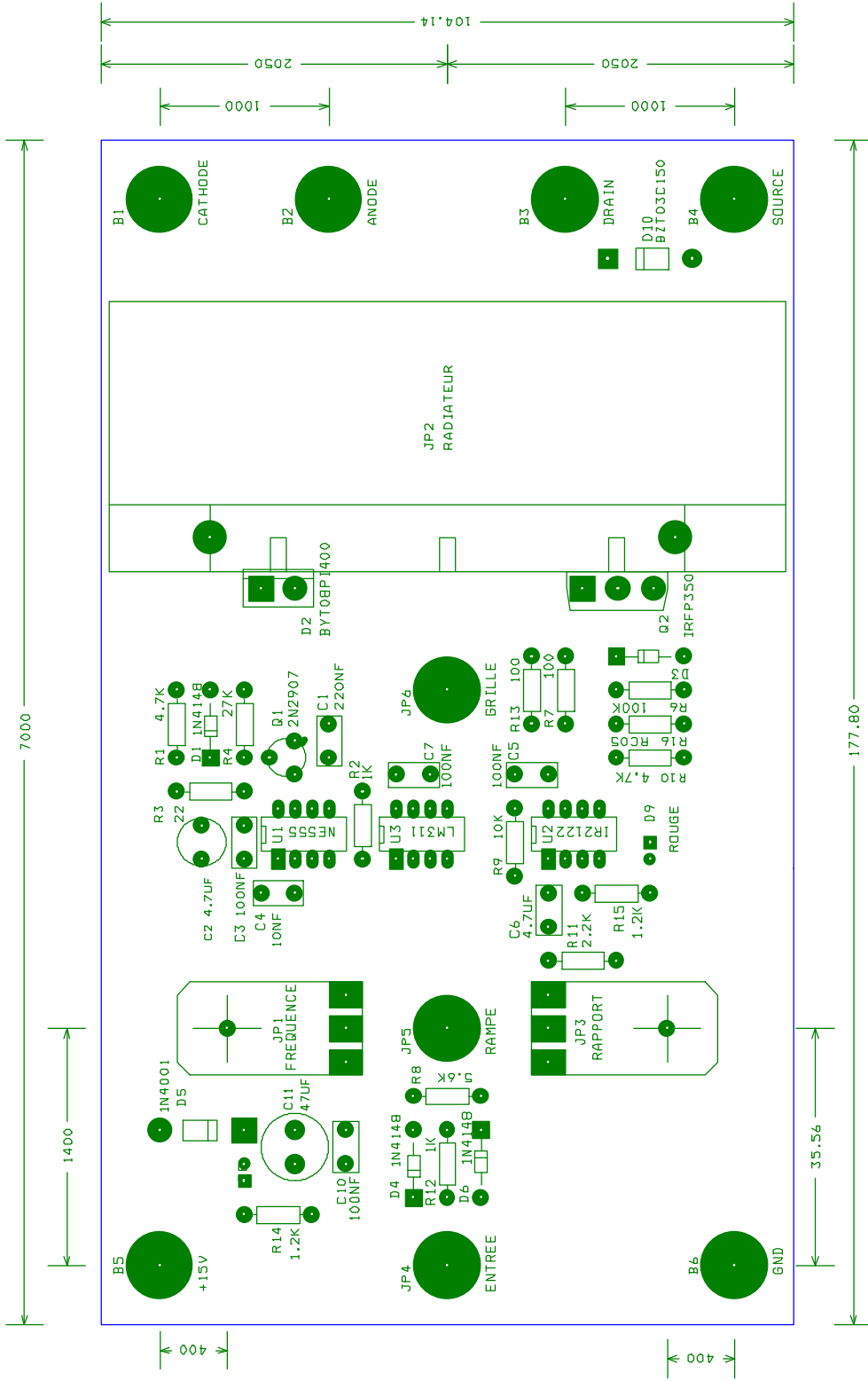
TOTAL H.T. :	, €
dont TVA : 19,60%	, €
<b>TOTAL T.T.C. :</b>	, €



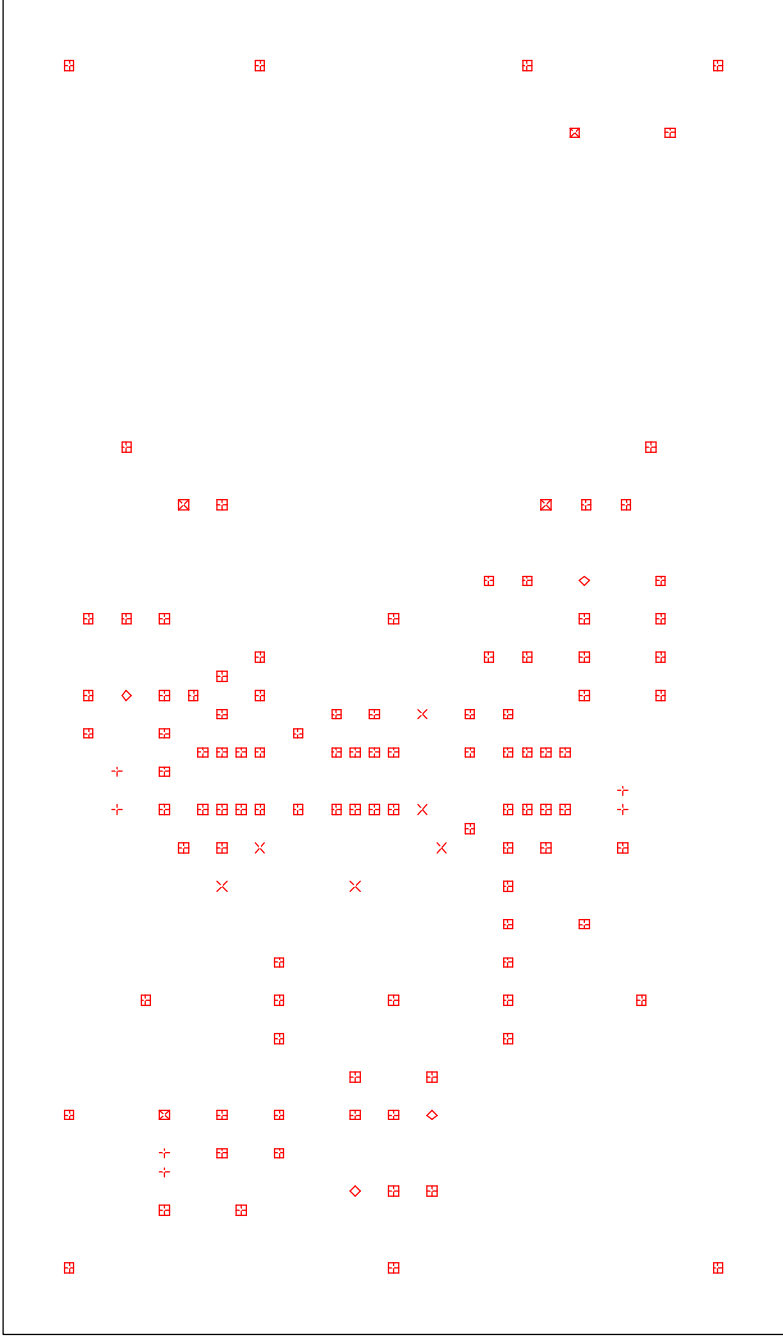
Auteur : Thierry LEQUEU		
Title Hacheur et sa commande		
Size A4	Document Number IUT2 / HACHEUR2 / [DATA157]	Rev 6
Date:	Sunday, February 10, 2002	Sheet 1 of 1







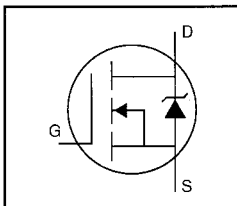




DRILL CHART				
SYM	DIAM	TOL	QTY	NOTE
◇	0.254 mm		4	
⊞	0.508 mm		101	
×	0.711 mm		6	
⊞	0.762 mm		4	
+	0.787 mm		6	
TOTAL			121	

## HEXFET® Power MOSFET

- Dynamic  $dv/dt$  Rating
- Repetitive Avalanche Rated
- Isolated Central Mounting Hole
- Fast Switching
- Ease of Paralleling
- Simple Drive Requirements



$$V_{DSS} = 400V$$

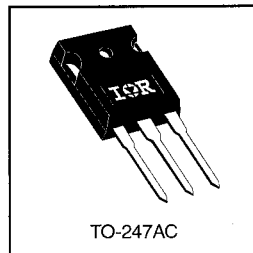
$$R_{DS(on)} = 0.30\Omega$$

$$I_D = 16A$$

### Description

Third Generation HEXFETs from International Rectifier provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The TO-247 package is preferred for commercial–industrial applications where higher power levels preclude the use of TO-220 devices. The TO-247 is similar but superior to the earlier TO-218 package because of its isolated mounting hole. It also provides greater creepage distance between pins to meet the requirements of most safety specifications.



DATA SHEETS


### Absolute Maximum Ratings

	Parameter	Max.	Units
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10 V$	16	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10 V$	10	
$I_{DM}$	Pulsed Drain Current ①	64	
$P_D @ T_C = 25^\circ C$	Power Dissipation	190	W
	Linear Derating Factor	1.5	W/°C
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$E_{AS}$	Single Pulse Avalanche Energy ②	390	mJ
$I_{AR}$	Avalanche Current ①	16	A
$E_{AR}$	Repetitive Avalanche Energy ①	19	mJ
$dv/dt$	Peak Diode Recovery $dv/dt$ ③	4.0	V/ns
$T_J$	Operating Junction and	-55 to +150	°C
$T_{STG}$	Storage Temperature Range		
	Soldering Temperature, for 10 seconds		
	Mounting Torque, 6-32 or M3 screw	10 lbf•in (1.1 N•m)	


### Thermal Resistance

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	—	0.65	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	—	0.24	—	
$R_{\theta JA}$	Junction-to-Ambient	—	—	40	

## Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	400	—	—	V	$V_{GS}=0V, I_D=250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.51	—	$V/^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D=1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.30	$\Omega$	$V_{GS}=10V, I_D=9.6A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS}=V_{GS}, I_D=250\mu A$
$g_{fs}$	Forward Transconductance	10	—	—	S	$V_{DS}=50V, I_D=9.6A$ ④
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	25	$\mu A$	$V_{DS}=400V, V_{GS}=0V$
		—	—	250		$V_{DS}=320V, V_{GS}=0V, T_J=125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS}=20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS}=-20V$
$Q_g$	Total Gate Charge	—	—	150	nC	$I_D=16A$
$Q_{gs}$	Gate-to-Source Charge	—	—	23		$V_{DS}=320V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	—	80		$V_{GS}=10V$ See Fig. 6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	—	16	—	ns	$V_{DD}=200V$
$t_r$	Rise Time	—	49	—		$I_D=16A$
$t_{d(off)}$	Turn-Off Delay Time	—	87	—		$R_G=6.2\Omega$
$t_f$	Fall Time	—	47	—		$R_D=12\Omega$ See Figure 10 ④
$L_D$	Internal Drain Inductance	—	5.0	—	nH	Between lead, 6 mm (0.25in.) from package and center of die contact
$L_S$	Internal Source Inductance	—	13	—		
$C_{iss}$	Input Capacitance	—	2600	—	pF	$V_{GS}=0V$
$C_{oss}$	Output Capacitance	—	660	—		$V_{DS}=25V$
$C_{rss}$	Reverse Transfer Capacitance	—	250	—		$f=1.0\text{MHz}$ See Figure 5

## Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	16	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	64		
$V_{SD}$	Diode Forward Voltage	—	—	1.6	V	$T_J=25^\circ\text{C}, I_S=16A, V_{GS}=0V$ ②
$t_{rr}$	Reverse Recovery Time	—	380	570	ns	$T_J=25^\circ\text{C}, I_F=16A$
$Q_{rr}$	Reverse Recovery Charge	—	4.7	7.1	$\mu\text{C}$	$di/dt=100A/\mu\text{s}$ ④
$t_{on}$	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by $L_S+L_D$ )				

### Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature (See Figure 11)
- ②  $V_{DD}=50V$ , starting  $T_J=25^\circ\text{C}$ ,  $L=2.7\text{mH}$ ,  $R_G=25\Omega$ ,  $I_{AS}=16A$  (See Figure 12)
- ③  $I_{SD}\leq 16A$ ,  $di/dt\leq 200A/\mu\text{s}$ ,  $V_{DD}\leq V_{(BR)DSS}$ ,  $T_J\leq 150^\circ\text{C}$
- ④ Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .

## FAST RECOVERY RECTIFIER DIODES

### MAIN PRODUCT CHARACTERISTICS

$I_{F(AV)}$	<b>8 A</b>
$V_{RRM}$	<b>400 V</b>
$V_F(\max)$	<b>1.4 V</b>
$t_{rr}(\max)$	<b>35 ns</b>

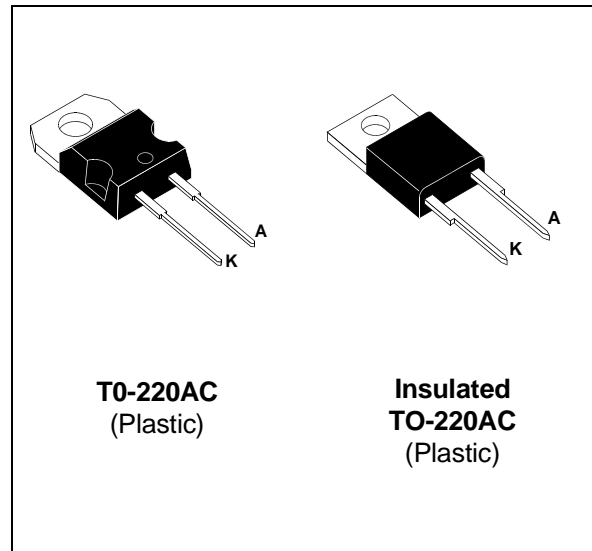
### FEATURES AND BENEFITS

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING
- INSULATED PACKAGE: TO-220AC  
Insulation voltage: 2500 V<sub>RMS</sub>  
Capacitance = 7 pF

### DESCRIPTION

This single rectifier is suited for Switch Mode Power Supplies and other power converters.

This device is intended to free-wheeling function in converters and motor control circuits.



### ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit	
$V_{RRM}$	Repetitive peak reverse voltage		400	V	
$I_{FRM}$	Repetitive peak forward current	$t_p=5 \mu s$ $F=5kHz$	200	A	
$I_{F(RMS)}$	RMS forward current		16	A	
$I_{F(AV)}$	Average forward current	TO-220AC	$T_c = 120^\circ C$ $\delta = 0.5$	8	A
		Insulated TO-220AC	$T_c = 105^\circ C$		
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10 ms$ Sinusoidal	100	A	
$T_{stg}$	Storage temperature range		- 40 to + 150	$^\circ C$	
$T_j$	Maximum operating junction temperature		150	$^\circ C$	

## BYT08P-400 / BYT08PI-400

### THERMAL RESISTANCES

Symbol	Parameter	Value	Unit
R <sub>th(j-c)</sub>	Junction to case	TO-220AC	2.5
		Ins. TO-220AC	3.5

### STATIC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>F</sub> *	Forward voltage drop	T <sub>j</sub> = 25°C			1.5	V
		T <sub>j</sub> = 100°C			1.4	
I <sub>R</sub> **	Reverse leakage current	T <sub>j</sub> = 25°C	V <sub>R</sub> = V <sub>RRM</sub>		15	μA
		T <sub>j</sub> = 100°C			2.5	mA

Pulse test : \* tp = 380 μs, δ < 2%

\*\* tp = 5 ms, δ < 2%

To evaluate the conduction losses use the following equation:

$$P = 1.1 \times I_{F(AV)} + 0.024 I_{F(RMS)}^2$$

### RECOVERY CHARACTERISTICS

Symbol	Test Conditions	Min.	Typ.	Max.	Unit
t <sub>rr</sub>	T <sub>j</sub> = 25°C			75	ns
	I <sub>F</sub> = 1A V <sub>R</sub> = 30V dI <sub>F</sub> /dt = - 15A/μs I <sub>F</sub> = 0.5A I <sub>R</sub> = 1A I <sub>rr</sub> = 0.25A			35	

### TURN-OFF SWITCHING CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t <sub>IRM</sub>	Maximum reverse recovery time	dI <sub>F</sub> /dt = - 32 A/μs		50	75	ns
		dI <sub>F</sub> /dt = - 64 A/μs				
I <sub>RM</sub>	Maximum reverse recovery current	dI <sub>F</sub> /dt = - 32 A/μs	L <sub>p</sub> ≤ 0.05 μH T <sub>j</sub> = 100°C (see fig. 13)	2.8		A
		dI <sub>F</sub> /dt = - 64 A/μs				
C = $\frac{V_{RP}}{V_{CC}}$	Turn-off overvoltage coefficient	T <sub>j</sub> = 100°C V <sub>CC</sub> = 60V I <sub>F</sub> = I <sub>F(AV)</sub> dI <sub>F</sub> /dt = - 30A/μs L <sub>p</sub> = 1μH		3.3		/



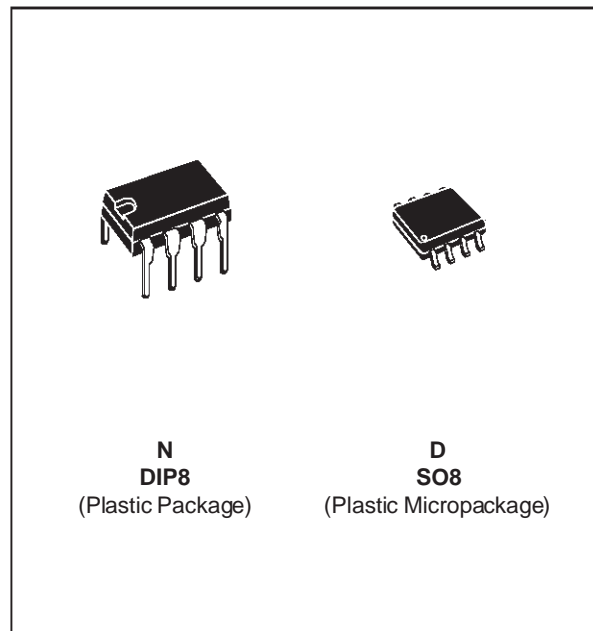
# NE555 SA555 - SE555

## 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°C

### DESCRIPTION

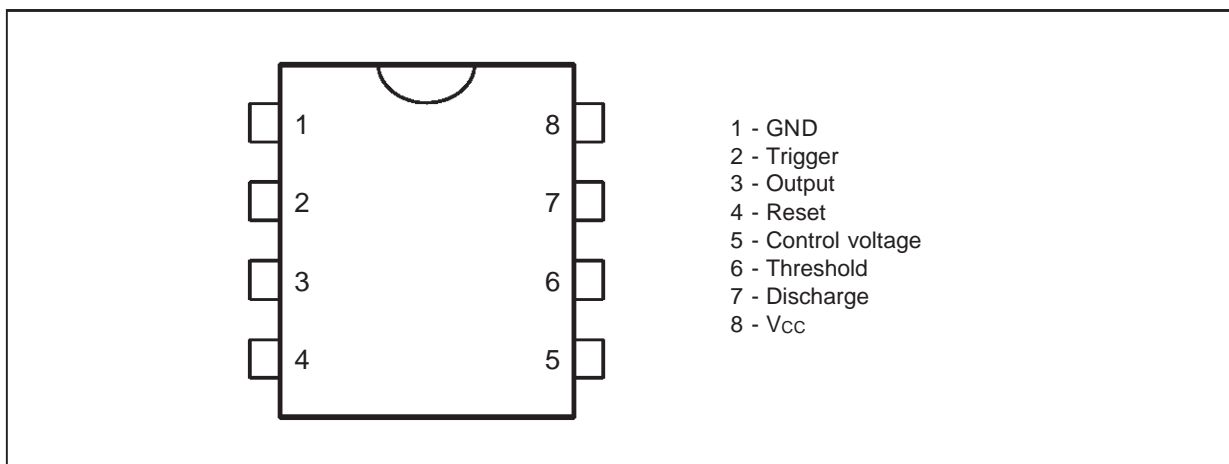
The NE555 monolithic timing circuit is a highly stable controller capable of producing accurate time delays or oscillation. In the time delay mode of operation, the time is precisely controlled by one external resistor and capacitor. For a stable operation as an oscillator, the free running frequency 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°C, 70°C	•	•
SA555	-40°C, 105°C	•	•
SE555	-55°C, 125°C	•	•

### PIN CONNECTIONS (top view)



## LM111/LM211/LM311 Voltage Comparator

### 1.0 General Description

The LM111, LM211 and LM311 are voltage comparators that have input currents nearly a thousand times lower than devices like the LM106 or LM710. They are also designed to operate over a wider range of supply voltages: from standard  $\pm 15V$  op amp supplies down to the single 5V supply used for IC logic. Their output is compatible with RTL, DTL and TTL as well as MOS circuits. Further, they can drive lamps or relays, switching voltages up to 50V at currents as high as 50 mA.

Both the inputs and the outputs of the LM111, LM211 or the LM311 can be isolated from system ground, and the output can drive loads referred to ground, the positive supply or the negative supply. Offset balancing and strobe capability are provided and outputs can be wire OR'ed. Although slower than the LM106 and LM710 (200 ns response time vs 40 ns)

the devices are also much less prone to spurious oscillations. The LM111 has the same pin configuration as the LM106 and LM710.

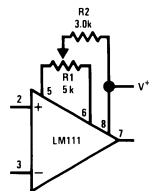
The LM211 is identical to the LM111, except that its performance is specified over a  $-25^{\circ}C$  to  $+85^{\circ}C$  temperature range instead of  $-55^{\circ}C$  to  $+125^{\circ}C$ . The LM311 has a temperature range of  $0^{\circ}C$  to  $+70^{\circ}C$ .

### 2.0 Features

- Operates from single 5V supply
- Input current: 150 nA max. over temperature
- Offset current: 20 nA max. over temperature
- Differential input voltage range:  $\pm 30V$
- Power consumption: 135 mW at  $\pm 15V$

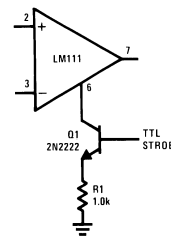
### 3.0 Typical Applications (Note 3)

#### Offset Balancing



DS005704-36

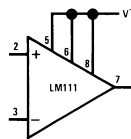
#### Strobing



DS005704-37

**Note:** Do Not Ground Strobe Pin. Output is turned off when current is pulled from Strobe Pin.

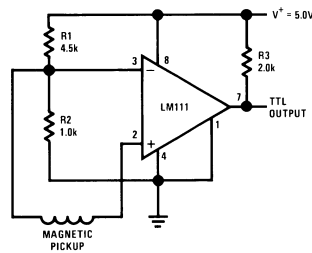
#### Increasing Input Stage Current (Note 1)



DS005704-38

**Note 1:** Increases typical common mode slew from  $7.0V/\mu s$  to  $18V/\mu s$ .

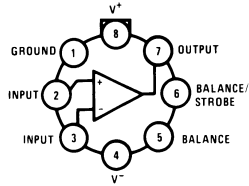
#### Detector for Magnetic Transducer



DS005704-39

## 11.0 Connection Diagrams

**Metal Can Package**



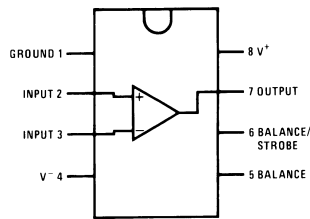
DS005704-6

**Note:** Pin 4 connected to case

**Top View**

Order Number LM111H, LM111H/883(Note 21) , LM211H or LM311H  
See NS Package Number H08C

**Dual-In-Line Package**

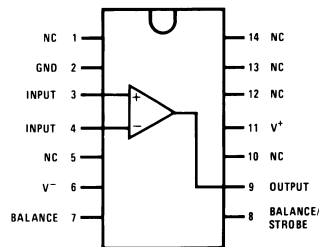


DS005704-34

**Top View**

Order Number LM111J-8, LM111J-8/883(Note 21) ,  
LM211J-8, LM211M, LM311M or LM311N  
See NS Package Number J08A, M08A or N08E

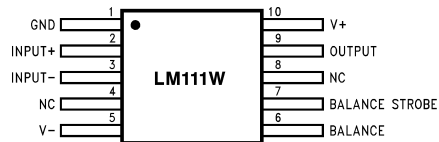
**Dual-In-Line Package**



DS005704-35

**Top View**

Order Number LM111J/883(Note 21) or LM311N-14  
See NS Package Number J14A or N14A



DS005704-33

Order Number LM111W/883(Note 21), LM111WG/883  
See NS Package Number W10A, WG10A

**Note 21:** Also available per JM38510/10304



**CURRENT SENSING SINGLE CHANNEL DRIVER**

**Features**

- Floating channel designed for bootstrap operation  
 Fully operational to +600V  
 Tolerant to negative transient voltage  
 dV/dt immune
- Gate drive supply range from 10 to 20V
- Undervoltage lockout
- 5V Schmitt-triggered input logic
- $\overline{\text{FAULT}}$  lead indicates shutdown has occurred
- Output out of phase with input

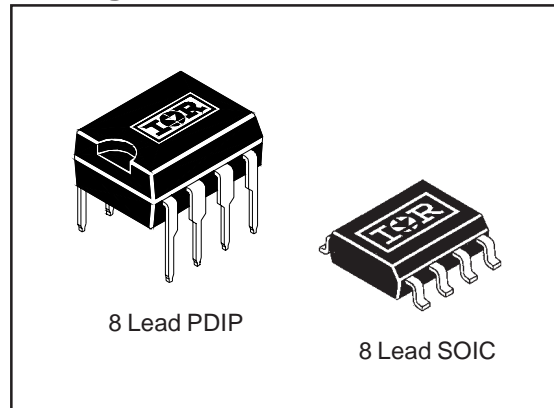
**Product Summary**

$V_{\text{OFFSET}}$	600V max.
$I_{\text{O}+/-}$	110 mA / 110 mA
$V_{\text{OUT}}$	10 - 20V
$V_{\text{Csth}}$	500 mV
$t_{\text{on/off (typ.)}}$	250 & 200 ns

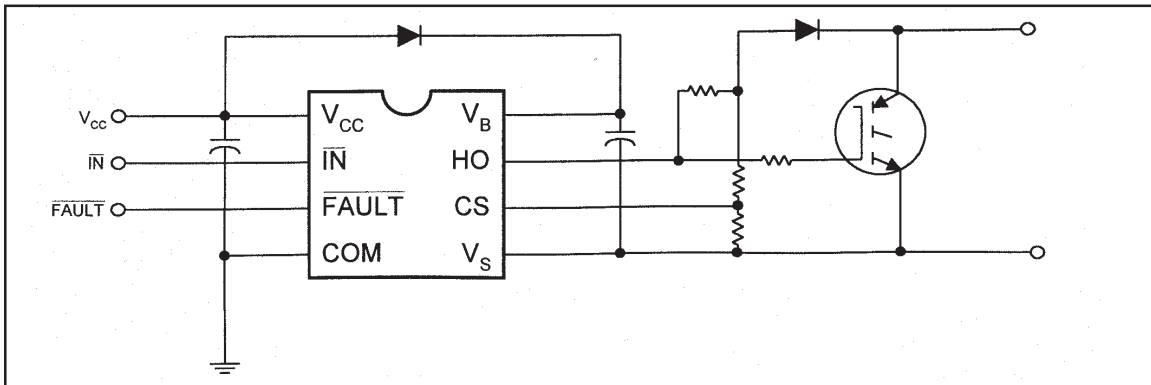
**Description**

The IR2122 is a high voltage, high speed power MOSFET and IGBT driver. Proprietary HVIC and latch immune CMOS technologies enable ruggedized monolithic construction. The logic input is compatible with standard CMOS or LSTTL outputs. The protection circuitry detects over-current in the driven power transistor and terminates the gate drive voltage. An open drain  $\overline{\text{FAULT}}$  signal is provided to indicate that an over-current shutdown has occurred. The output driver features a high pulse current buffer stage designed for minimum cross-conduction. The floating channel can be used to drive an N-channel power MOSFET or IGBT in the high side or low side configuration which operates up to 600 volts.

**Packages**



**Typical Connection**



## Isolateurs Sil-Pad 400

Bergquist



- Les Sil-Pad 400 sont des isolateurs à base de caoutchouc silicone et de fibre de verre.
- Ce matériau ignifuge est conçu pour servir d'isolateur thermo-conductible.
- Possèdent d'excellentes caractéristiques mécaniques et physiques.
- Résistent aux produits de nettoyage.
- Disponibles en modèle sec ou autocollant.
- Le renforcement aux fibres de verre assure une excellente résistance au perçage.
- Les surfaces pliables assurent un contact de surface parfait de même qu'une excellente dissipation thermique.
- Les Sil-Pad 400 sont non toxiques.
- Applications: utilisés comme isolant entre les alimentations et radiateurs.

### Spécifications techniques

Epaisseur: 0,18 mm

Résistance thermique: 0,40°C/W (pour boîtier TO-3)

Conductibilité thermique: 0,9 W/m-k

Isolation électrique: 4 kV

U.D.V.=1

réf. Bergquist	boîtier	code commande	prix de l'U.D.V.	
			1-9	10+
Secs				
3223 07 FR-122	TO-3P	<a href="#">283-3638</a>	117.87 Fr	94.30 Fr
3223 07 FR-54	TO-220	<a href="#">169-2177</a>	98.97 Fr	79.18 Fr
3223 07 FR-05	TO-3	<a href="#">169-2183</a>	145.17 Fr	116.14 Fr
3223 07 FR-31	TO-66	<a href="#">169-2199</a>	125.36 Fr	100.29 Fr
3223 07 FR-50	TO-126	<a href="#">169-2206</a>	91.06 Fr	72.85 Fr
3223 07 FR-104	TO-218	<a href="#">169-2212</a>	112.17 Fr	89.74 Fr
3223 07 FR-53	TIP	<a href="#">169-2234</a>	105.57 Fr	84.46 Fr
3223 07 FR-20	DO-4	<a href="#">169-2240</a>	95.01 Fr	76.01 Fr
3223 07 FR-21	DO-5	<a href="#">169-2256</a>	106.89 Fr	85.51 Fr
Autocollants				
3223 07 AC-122	TO-3P	<a href="#">283-3644</a>	135.81 Fr	108.65 Fr
3223 07 AC-54	TO-220	<a href="#">169-2262</a>	108.21 Fr	86.57 Fr
3223 07 AC-05	TO-3	<a href="#">169-2278</a>	174.19 Fr	139.35 Fr
3223 07 AC-31	TO-66	<a href="#">169-2284</a>	141.20 Fr	112.96 Fr
3223 07 AC-50	TO-126	<a href="#">169-2290</a>	95.01 Fr	76.01 Fr
3223 07 AC-104	TO-218	<a href="#">169-2307</a>	120.08 Fr	96.06 Fr
3223 07 AC-53	TIP	<a href="#">169-2313</a>	116.13 Fr	92.90 Fr
3223 07 AC-20	DO-4	<a href="#">169-2329</a>	101.61 Fr	81.29 Fr
3223 07 AC-21	DO-5	<a href="#">169-2335</a>	120.08 Fr	96.06 Fr