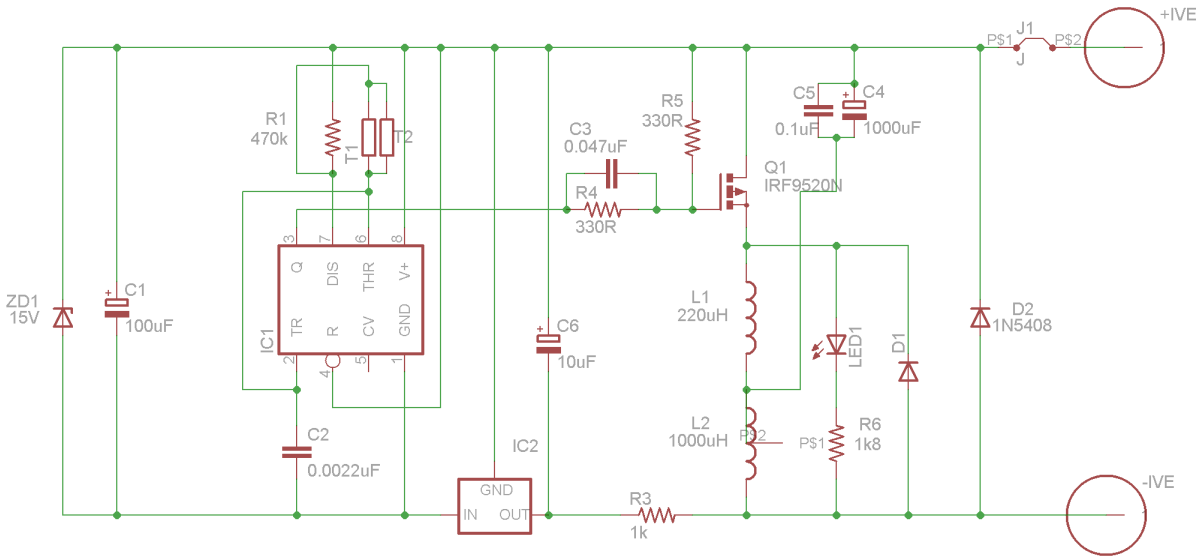
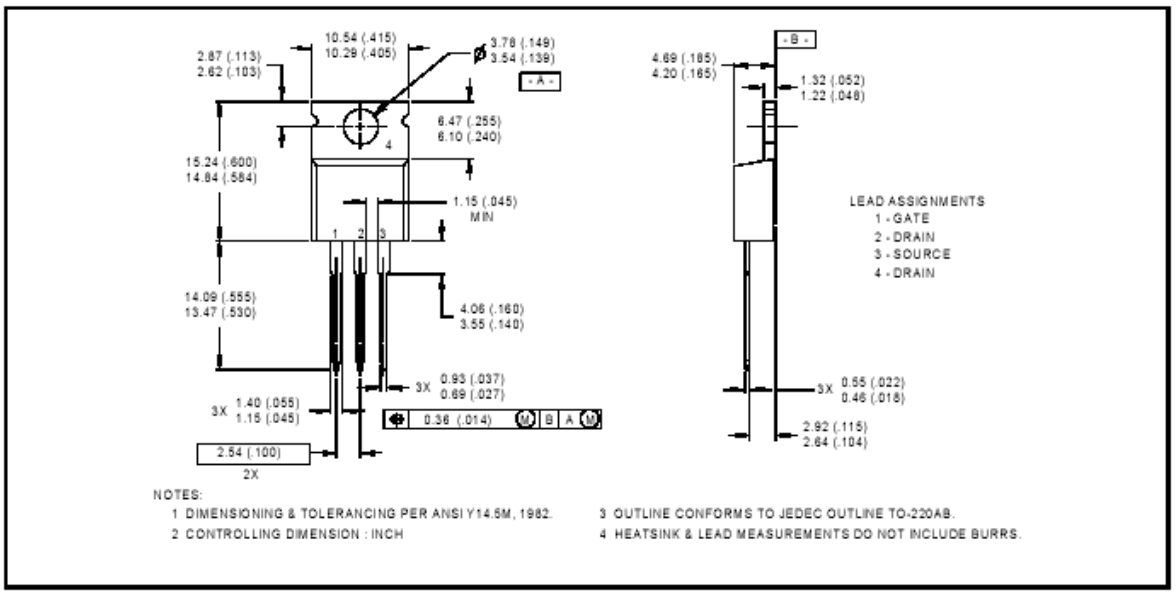
24V ‘HIGH POWER’ PULSER KIT ASSEMBLY INSTRUCTIONS

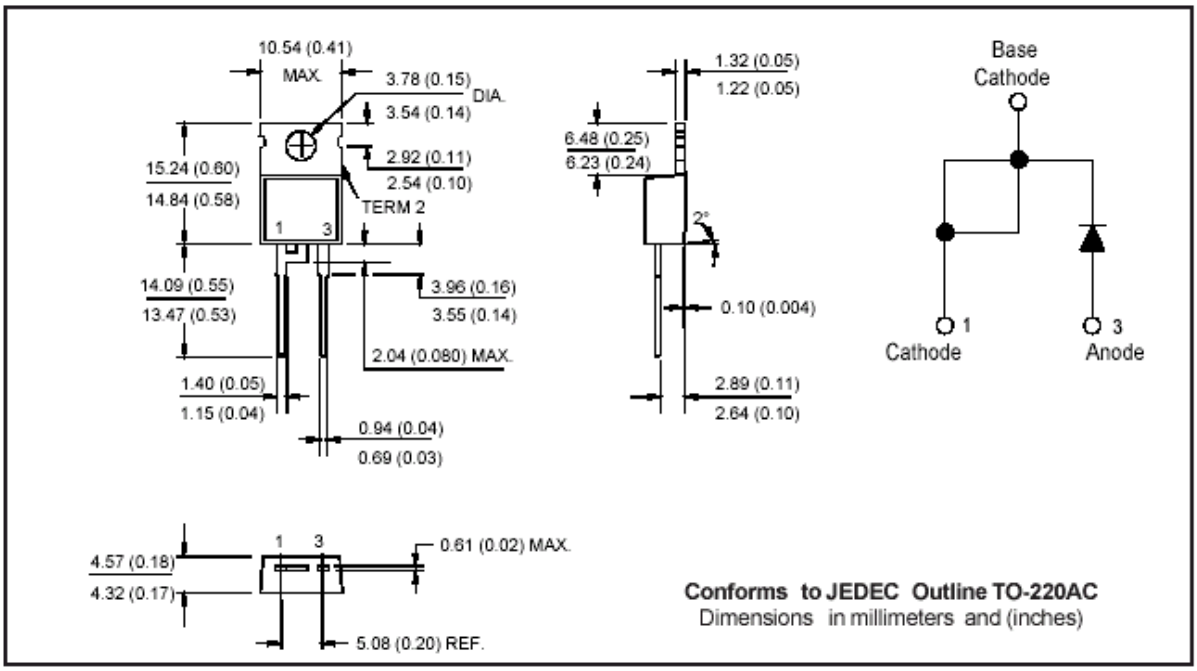
R1	470k (YPY)	1 off
R2/R2a	47k thermistors attached to Q1 & D1	2 off
R3	1k (BrBR)	1 off
R4,R5	330R (OOBr)	2 off
R6	1k8 (BrGyR)	1 off
C1	100uF	1 off
C2	0.0022uF/ 2.2nF (small two tone yellow – marked 2n2)	1 off
C3	0.047uF/ 47nF (yellow oblong – marked 47nK)	1 off
C4	1000uF/50V or greater	1 off
C5	0.1uF (small mustard coloured marked 104)	1 off
C6	10uF/35V	1 off
LED		1 off
D1	BYW29-500 / FES16J	1 off
D2	1N5408	1 off
Q1	IRFI9630G	1 off
IC1	555	1 off
	8 pin DIL socket	1 off
ZD1	15v	1 off
IC2	79L12 regulator	1 off
L1	220uH (marked 221L)	1 off
L2	1000uH (marked 102L)	1 off
	4mm bolt	2 off
	4mm nut	4 off
	4mm washer	4 off
	Fuse holder	1 off
	2A QB 20mm x 5mm fuse (1 spare)	2 off
	PCB	1 off

Resistor Colour Codes – B – black, BR – Brown, Gy – Grey, O – orange, P – purple, Y- yellow, R - Red



Please note that although the pin outs on the circuit diagram for the 79L12 regulator are shown wrong they are correctly orientated on the PCB.





The above two pictures will help identify the semiconductor pin outs.

DO NOT CONNECT THE PULSER TO THE BATTERY CHARGER – CONNECT IT TO THE BATTERY & THEN CONNECT THE CHARGER. MAKE SURE THE BATTERY CHARGER IS UNPLUGGED FROM THE MAINS SUPPLY BEFORE CONNECTING/DISCONNECTING

1. Check all components/ parts as listed above are present. Please note these are now the upgraded kits with a larger C4 and inductors.

2. Carefully remove the 555 chip from its DIL socket, do not insert until after all soldering of both the socket and immediately adjacent components is complete.

3. You have a choice as regards output connection. The PCB is supplied with 3.3mm holes. You will need to drill out the existing 3.3mm holes marked +ve and –ve to fit the 4mm brass bolts which

should be clamped to the PCB with one of the supplied nuts. The bolts heads should then be soldered to the pad. It will take a fair amount of heat but the bolt heads will take the solder. Be aware to let the bolt and solder cool down afterwards. The alternative is to solder your output lead direct to the PCB which is preferable but makes changing the leads more difficult.

4. The remaining two washers and nut should be used to enclose a 4mm eyed ring connector for a good solid electrical connection.

5. Components can then be inserted in any order, obviously excessive heat should be avoided. The MOSFET should be soldered in last though and should not be 'overly' handled. In my opinion they are not as sensitive to static as some might have you believe.

6. In the case of the diode and MOSFET it is a good idea to abrade/ clean the legs to ensure a good clean surface to solder to if an examination proves this to be a good idea.

7. C5 is supposed to allow the high frequency bits to pass more readily than through C4.

8. There is not a great deal of clearance between the output lead of D2 and the +ive terminal especially if you use the 4mm bolt option. The gap is adequate but I would suggest that you solder the end nearest the –ive terminal first then crimp the output lead to the body of the diode with a pair of suitably sized pliers prior to soldering it.

9. There is no point after this just using crocodile clips to connect to the battery. Use proper battery terminal connectors and a soldered ring terminal and do the connections up properly. To give you an idea of what you lose here on a 'high power' pulser fitted with a peak detector I was losing 20V through crocodile clips against a proper battery terminal clamp. I would also suggest using 10 or 12AWG cable for the output leads.

10. On completion check and double check that the right components are in the right place, and that there are no solder bridges.

11. Connect the negative lead from the pulser to the battery negative terminal first. Then briefly touch the positive lead to the positive terminal i.e. 1-2 seconds and note:-

    a) low level sparks as the lead contacts the battery terminal
    b) the LED should illuminate
    c) you should hear a distinct circa 1kHz tone from the PCB.

If you get all three then connect the pulser for progressively longer periods and monitor the coils/ MOSFET and diode for excessive heat. Once you have got to a minute it is fairly safe to assume that all is well.

If you get only some or none of the above then clearly something is wrong. Unless you managed to connect the pulser to the battery the wrong way around the components are fairly forgiving provided they are only connected for brief periods.

Re-check the components are in the right place and adequately soldered and that there are no bridges or dry joints. I have found that going around 're-making' all the soldered joints solves most of my problems.

I can be contacted at enquiries@courtiestown.co.uk or on 0146 483 1490. With regard to the latter option be aware I work offshore for half my life and that my wife may not be able to offer that much assistance and also that calls should be made at a civilised hour i.e. before 2100.

This device consumes in the region of 150mA so will obviously drain the battery if it is not charged.

I would suggest that you connect both the device and a trickle charger to the battery undergoing recovery (having first checked that the electrolyte level is OK) and leave the pulser to do its thing.

The voltage to which the battery will charge should increase over a period of 10-14 days, a really large battery may take longer. If you do not see this improvement then it is likely that the cause of the batteries poor performance is other then sulphation or that it is already too bad and the sulphation has bridged plates internally.

SIMPLE PULSER INSTRUCTIONS

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TO PREVENT DAMAGE BY SHORTING OUT OF THE PCB PLEASE ENSURE IT IS USED IN SOME FORM OF INSULATING CONTAINER (kits & unboxed pulsers only).

CONNECT YOUR NEGATIVE CABLE TO THE BOLTED TERMINAL MARKED –VE AND THE POSITIVE CABLE TO THE TOP OF THE INSULATED SPACER AT THE POSITION MARKED +VE. DO NOT DISCONNECT OR CHANGE THE DIODE OR FUSE CONNECTIONS, PLEASE REFER TO WEBSITE FOR PICTURES IF BUILDING A KIT FOR CORRECT CONNECTIONS (kits & unboxed pulsers only).

1. Is it working? If the red LED is lit and you can hear a distinct 'buzzing' noise then yes it is.

2. Only slightly less important is ensuring that any battery charging activities are carried out in a reasonably well ventilated environment. This is particularly relevant here as you will both hear and see sparks generated as you connect this device. This is perfectly normal, but possibly 'alarming' to the first time user.

3. The battery to be recovered must measure at least 10.5V 'open circuit'. Any less than this and the cause of the battery's deterioration may well be more than sulphation and this device is unlikely to function as intended i.e. recover a sulphated battery.

4. Ensure that the electrolyte levels are adequate prior to starting, these should be checked regularly whilst the device is in use. It may seem obvious but don't do this with the pulser connected, they don't like water.

5. The device should be used in conjunction with a simple trickle battery charger. The device itself consumes circa 40-90mA.

6. The pulser can be left connected whilst the trickle charger is connected/disconnected from the battery. I re-iterate, do not leave the pulser connected solely to the battery charger.

7. Having said this the device can be used on its own i.e. without a charger until the battery voltage drops to 10.5V i.e. trickle charge the battery in conjunction with the pulser until a peak is reached and then disconnect the charger and let the pulser 'pull' the battery voltage down. Depending on the state of the battery this could be several days.

8. If you have a voltmeter the simplest indication of the battery improving will be the maximum voltage achieved after charging each time. This should rise noticeably during the first week and then reduce over time.

   The next best reliable indicator is putting a load on it i.e. put it in a vehicle and try starting it – probably the simplest 'load test' around.

9. I cannot emphasise enough the importance of ensuring the voltage level doesn't drop below 10.5V at any time. It is almost certain irreversible battery damage will result.

10. Ready built pulsers have been bench tested prior to despatch.

11. The devices are now supplied with reverse polarity protection consisting of a fuse and a diode. In the event you have the misfortune to connect the device the wrong way around the fuse will blow. The device will be supplied with a 5 x 20mm quick blow fuse with a rating of between
    2 – 5A.

    I would suggest you get a stock of these in as we have all made the mistake of connecting these devices the wrong way round; the advantage now is that you only blow the fuse and not the whole device!!