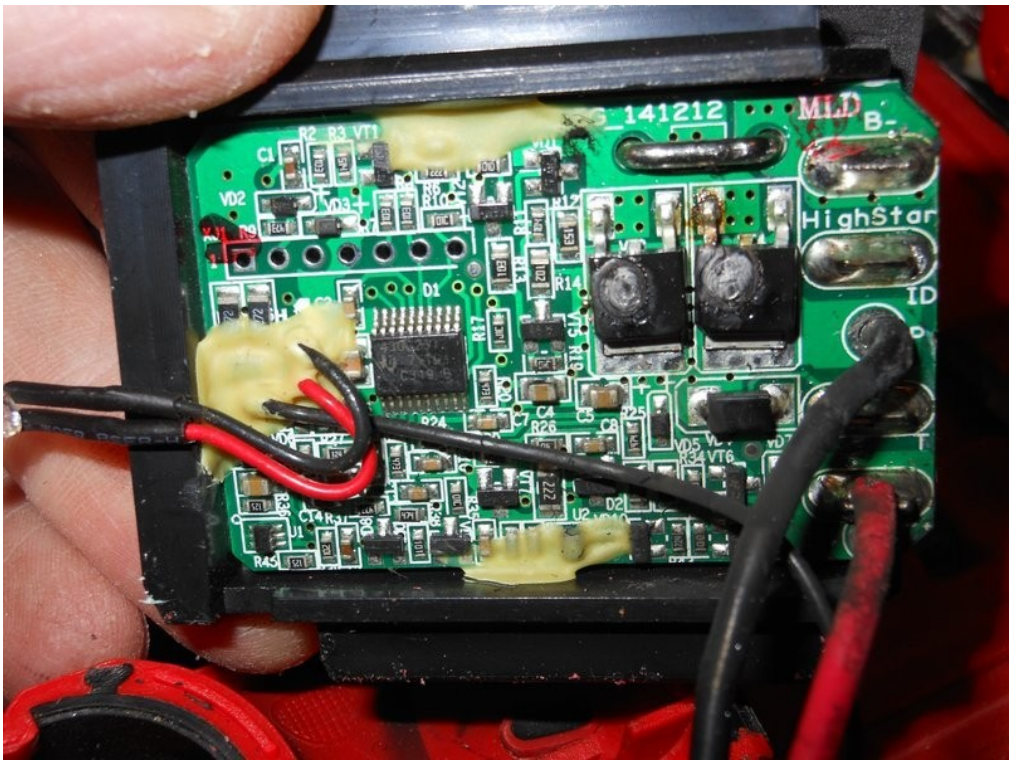
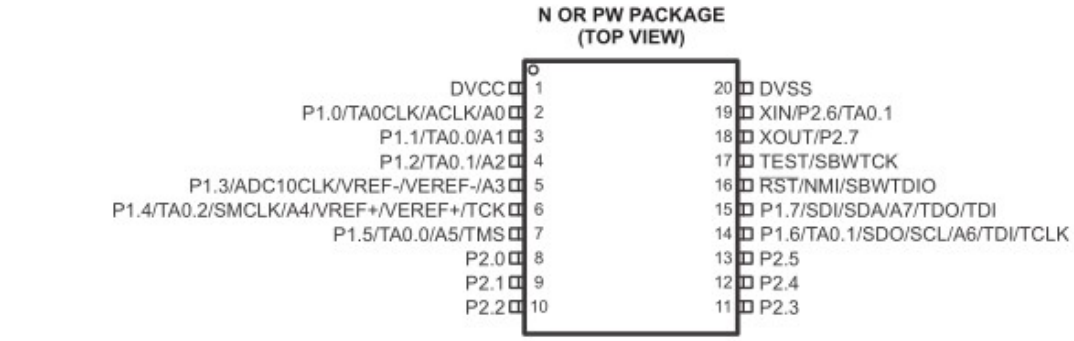
Harbor Freight Bauer Drill



Component Meltdown

2 Dpak components have big burnt out holes on them. Need replacement. What is their pinout?
Motor is Mabuchi model: RZ-735VA-A014. Range 6-20 volts.
Switch before motor is 7.2 – 24 volts.

Micro is TI msp430g252. Drills need a micro now. Great idea.../s
Question is, what is the level of the voltage regulator? Is it 20V?
It appears to be an onsemi (likely counterfeit) model such as: CS52015
I can't find an exact match from Digikey which only searches current models, not historical models.
I may be able to throw an adjustable vreg with similar pinout in...
The battery is 20V. The dpaks aren't getting any power, even when broken, unless switch is pressed.
I need my DMM which I don't have, to reverse engineer further.
The two DPaks have a pin tied together, and that pin may be adj for a vreg, adjusted by resistors.



NOTE: ADC10 pin functions are available only on MSP430G2x32.

Board. When switch is pressed, there is 20V on the tab of vreg. I believe the VReg must've overheated and shorted (perhaps counterfeit?). Original device must've been an adjustable vreg, per the resistors on the red line for adj. pin. Pin out is Tab = VIN, Left pin = Adj, ? Though Right pin is to GND. Maybe it's a current limiter, not an adjustable Vreg, allowing Tab when V+ to be dropped down and current will flow. In that respect, maybe these are power transistors. Not Vregs.

Trying to repair a harbor freight drill, and I need help identifying a Dpak component.

These two DPaks failed (overheated, and shorted I think) on the main circuit board. I'm not sure if they are some kind of constant current driver, or just a power transistor. I don't think they are voltage regulators. When you press the button on the drill, 20V from BAT+ goes to the tab. Pin 1 goes to a few resistors, and pin 3 goes to BAT-. Anyone have any ideas?

There are some other pins that go to the MSP430 micro, the VDD label is the micro's power, which I think is lower than 20V. The green line is from battery to the micro.

The marking on the DPak was melted off, but I could make out a CS something. I found some On Semi adjustable VRegs, but I don't think those are the part (e.g. CS52015) as the pinout seems to indicate something else.

Anonymous 10/22/18(Mon)18:51:16 No.1484857 ▶ >>1484989

>>1484700
They'll probably be switching FETs, and they look to be in parallel, which is odd for semiconductors. Since it's low-side switching they're NMOS, with the source being the pad, the gate being the left-most pin, and the drain being the right-most pin. At least from what I can see. I'd check what switching voltage is used, but it's probably 3.3V. So buy a couple of N-ch MOSFETs with a threshold voltage below 2.5V, V_DS above 24V, and as low an R_DS_on as you can reasonably get.

But she's a harbour freight drill, so don't expect any lasting performance even after fixing it.

t. never fixed anything

Anonymous 10/22/18(Mon)23:19:57 No.1484989 ▶ >>1484991 >>1485000

>>1484857
Thanks. I didn't buy it, but I did break it, and I figured it would be fun to repair it if possible.
Funny how a couple power transistors can break a drill. I wonder if old drills even have pcbs at all... I doubt it.

Anonymous 10/22/18(Mon)23:32:46 No.1484991 ▶ >>1485000

>>1484989
old drills probably don't have tetchy but power-dense battery packs. the few that had adjustable speeds did it triac-style and certainly didn't have a high power factor. features generally require components, same as ever
(but a microcontroller? that one's new on me)

Anonymous 10/22/18(Mon)23:50:29 No.1485000 ▶ >>1485003

>>1484989
Old drills have the trigger switch mechanically switching the power supply, while the modern ones use transistors such that they can switch far faster as a method of speed control; they PWM the output to change the power going to the motor. Though I doubt that drill has speed feedback.

>>1484991
>triac-style
Never heard of them doing that, though I guess that's since most teardowns I've seen have been of cordless drills.

Anonymous 10/22/18(Mon)23:58:35 No.1485003 ▶ >>1485006

>>1485000
yep just ye olde phase angle fired dimmer switch, with a trigger controlled pot
https://electronics.stackexchange.com/questions/167556/how-does-the-circuit-of-a-basic-variable-speed-electric-drill-work

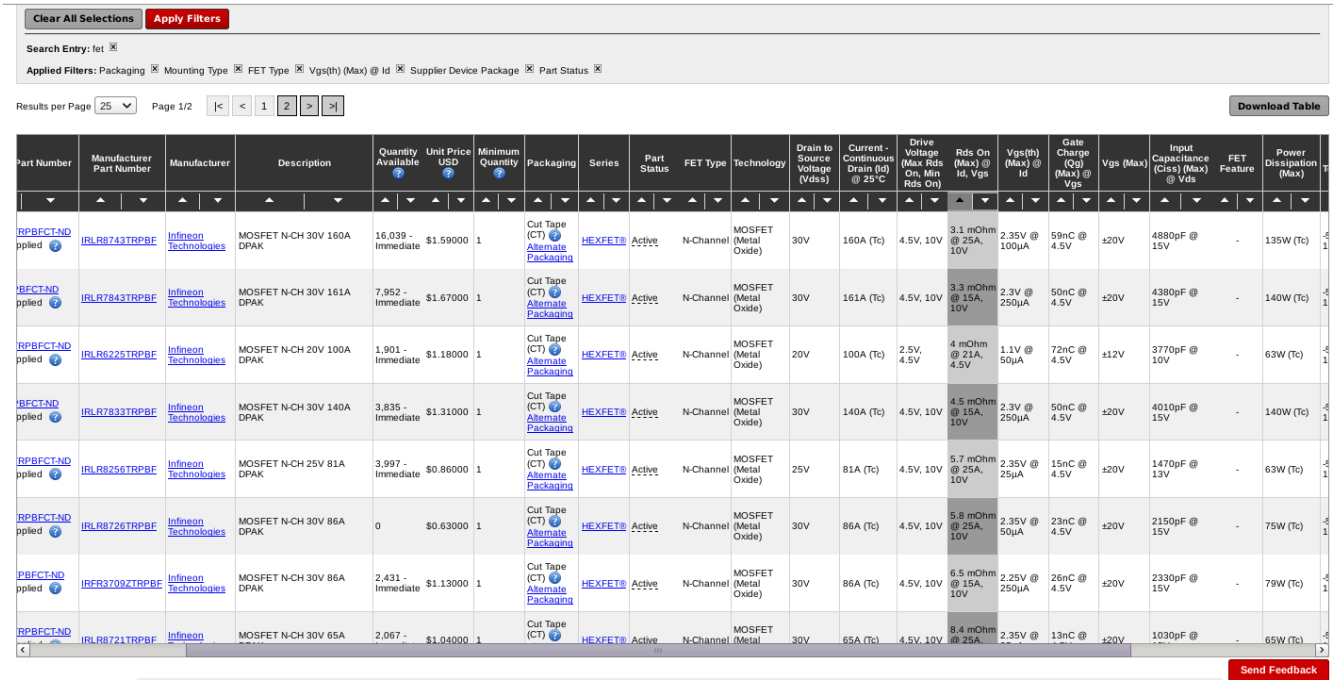
Anonymous 10/23/18(Tue)00:08:42 No.1485006 ▶ >>1485057

>>1485003
I know how a triac dimmer works, just surprised that that's what they were using. My old Hitachi corded drill has dimming but it's a step-wise switch with 10 discrete speeds, unlike what I'd expect from a triac dimmer with a linear pot inside the trigger switch. So either it's a triac dimmer with a bunch of resistors switched sequentially by wipers or spring contacts within the switch, or it's some sort of less-analogue dimmer. I'd imagine it's sequential spring contacts since it's been going strong for a few decades without any sign of a linear pot wearing out, which is a good enough reason to use such a system. It was made before the common clamshell setup we've got today, the back 1/4 comes off with lengthways screws, with the front gearbox housing and the left quarter being moulded together, if I remember right. Big front-end bearing on it too, only one speed in each direction and certainly no clutch; nothing I'd want

Anonymous 10/23/18(Tue)04:46:39 No.1485057 ▶

>>1485006
The most common way to produce the stepped effect is to add some mechanical stepping on the otherwise linear pot.
An old Bosch drill I opened a while ago had a thick film hybrid for its dimmer. The hybrid included a linear pot, or more accurately, just the resistive track. It would've been a simple matter to replace the track with a bunch of contact pads and some printed resistors. It wouldn't have increased the price either. IIRC it actually had one such contact pad at the low end of the pot for the "totally off" position.

So far, this is what I ended up getting based on the above post. Just need to make sure the pinout is identical. EDIT :I had to redo the search, but that is similar.



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Search Entry: fet

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Part Number	Manufacturer Part Number	Manufacturer	Description	Quantity Available	Unit Price USD	Minimum Quantity	Packaging	Series	Part Status	FET Type	Technology	Drain to Source Voltage (Vdss)	Current - Continuous Drain (Id) @ 25°C	Drive Voltage (Max Rds On, Min Rds On)	Rds On (Max) @ Id, Vgs	Vgs(th) (Max) @ Id	Gate Charge (Qg) (Max) @ Vgs	Vgs (Max)	Input Capacitance (Ciss) (Max) @ Vds	FET Feature	Power Dissipation (Max)
RPBFCT-ND Applied	IRLR8743TRPBF	Infineon Technologies	MOSFET N-CH 30V 160A DPAK	16,039 - Immediate	$1.59000	1	Cut Tape (CT) Alternate Packaging	HEXFET®	Active	N-Channel	MOSFET (Metal Oxide)	30V	160A (Tc)	4.5V, 10V	3.1 mOhm @ 25A, 10V	2.35V @ 100µA	59nC @ 4.5V	±20V	4880pF @ 15V	-	135W (Tc)
BFCT-ND Applied	IRLR7843TRPBF	Infineon Technologies	MOSFET N-CH 30V 161A DPAK	7,952 - Immediate	$1.67000	1	Cut Tape (CT) Alternate Packaging	HEXFET®	Active	N-Channel	MOSFET (Metal Oxide)	30V	161A (Tc)	4.5V, 10V	3.3 mOhm @ 15A, 10V	2.3V @ 250µA	50nC @ 4.5V	±20V	4380pF @ 15V	-	140W (Tc)
RPBFCT-ND Applied	IRLR6225TRPBF	Infineon Technologies	MOSFET N-CH 20V 100A DPAK	1,901 - Immediate	$1.18000	1	Cut Tape (CT) Alternate Packaging	HEXFET®	Active	N-Channel	MOSFET (Metal Oxide)	20V	100A (Tc)	2.5V, 4.5V	4 mOhm @ 21A, 4.5V	1.1V @ 50µA	72nC @ 4.5V	±12V	3770pF @ 10V	-	63W (Tc)
BFCT-ND Applied	IRLR7833TRPBF	Infineon Technologies	MOSFET N-CH 30V 140A DPAK	3,835 - Immediate	$1.31000	1	Cut Tape (CT) Alternate Packaging	HEXFET®	Active	N-Channel	MOSFET (Metal Oxide)	30V	140A (Tc)	4.5V, 10V	4.5 mOhm @ 15A, 10V	2.3V @ 250µA	50nC @ 4.5V	±20V	4010pF @ 15V	-	140W (Tc)
RPBFCT-ND Applied	IRLR8256TRPBF	Infineon Technologies	MOSFET N-CH 25V 81A DPAK	3,997 - Immediate	$0.86000	1	Cut Tape (CT) Alternate Packaging	HEXFET®	Active	N-Channel	MOSFET (Metal Oxide)	25V	81A (Tc)	4.5V, 10V	5.7 mOhm @ 25A, 10V	2.35V @ 25µA	15nC @ 4.5V	±20V	1470pF @ 13V	-	63W (Tc)
RPBFCT-ND Applied	IRLR8726TRPBF	Infineon Technologies	MOSFET N-CH 30V 86A DPAK	0	$0.63000	1	Cut Tape (CT) Alternate Packaging	HEXFET®	Active	N-Channel	MOSFET (Metal Oxide)	30V	86A (Tc)	4.5V, 10V	5.8 mOhm @ 25A, 10V	2.35V @ 50µA	23nC @ 4.5V	±20V	2150pF @ 15V	-	75W (Tc)
PBFCT-ND Applied	IRFR3709ZTRPBF	Infineon Technologies	MOSFET N-CH 30V 86A DPAK	2,431 - Immediate	$1.13000	1	Cut Tape (CT) Alternate Packaging	HEXFET®	Active	N-Channel	MOSFET (Metal Oxide)	30V	86A (Tc)	4.5V, 10V	6.5 mOhm @ 15A, 10V	2.25V @ 250µA	26nC @ 4.5V	±20V	2330pF @ 15V	-	79W (Tc)
RPBFCT-ND Applied	IRLR8721TRPBF	Infineon	MOSFET N-CH 30V 65A	2,067 -	$1.04000	1	Cut Tape (CT)	HEXFET®	Active	N-Channel	MOSFET (Metal	30V	65A (Tc)	4.5V, 10V	8.4 mOhm @ 25A,	2.35V @	13nC @	±20V	1030pF @	-	65W (Tc)

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