



Energy Harvesting To Go



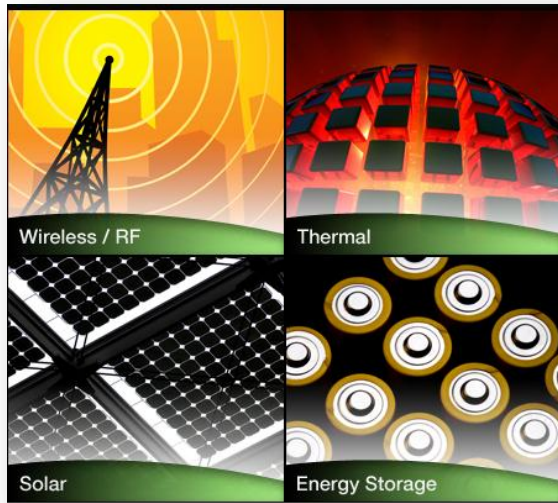
**more
than you
expect**

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Product Development Manager**

**Würth Elektronik
eiSos GmbH & CO.KG**

Energy Harvesting

- Environment energy captured and converted into electricity for small autonomous devices making them self-sufficient.



WR-COM
651 005 161 21
WR-CBF
742 792 022
WR-PHD
610 020 211
WR-TBL
691 411 710 002
WR-TPC 4828
744 043 220
WR-TPC 2811
744 028 220
WR-EHPI
744 885 400 70
WR-TPC 3816
744 031 100
Battery Holder
795 231 41
WE-CBF
742 792 66
WL-SMCW
150 060 YS7 500 0
150 060 BS7 500 0
150 060 RS7 500 0
WE-TSS
430 182 043 816
WE-PD2
S11 100 017

- ❖ Thermo Electric Generator (heat)
- ❖ Piezo Electric (vibration/strain)
- ❖ Photovoltaic (light)
- ❖ Galvanic (chemical)
- ❖ Induction (motion)

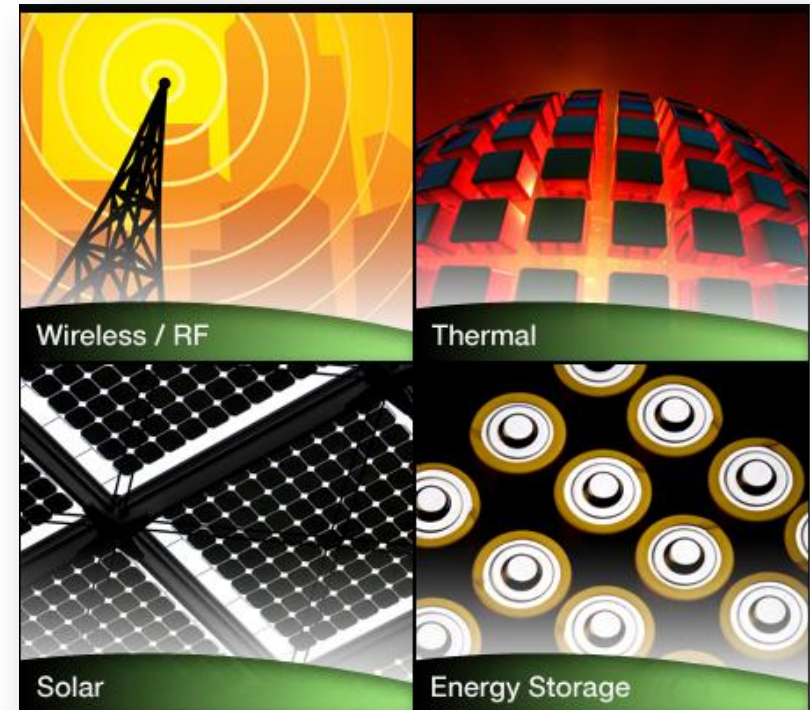
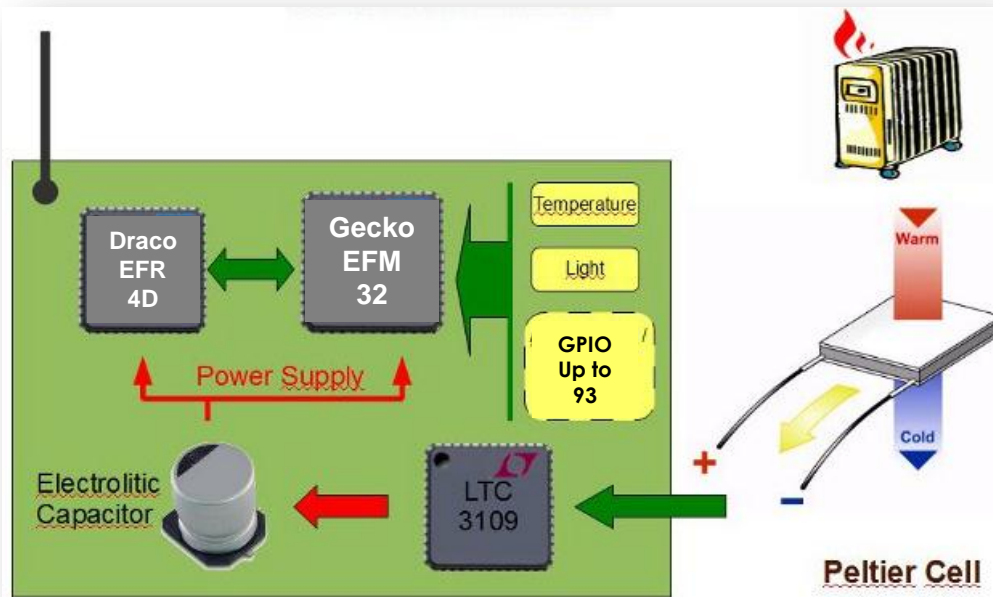
Energy Management & Storage

Regulated Voltage



What is Energy Harvesting

- The process by which energy is derived from external sources, captured and stored for use in electronic systems
- Energy harvesting is the process by which ambient energy is captured and converted into electricity for small autonomous devices, such as satellites, laptops and nodes in sensor networks making them self-sufficient.





Where is it useful?

- Where line power is unavailable or costly
- Where batteries are costly or difficult to replace
- Where energy is needed only when ambient energy is present

Asset Tracking/Monitoring



Building Security, Lighting & Climate Control



Plant Automation



Remote Monitoring



TPMS



Source: LTC - Sam Nork – Energy Harvesting Presentation

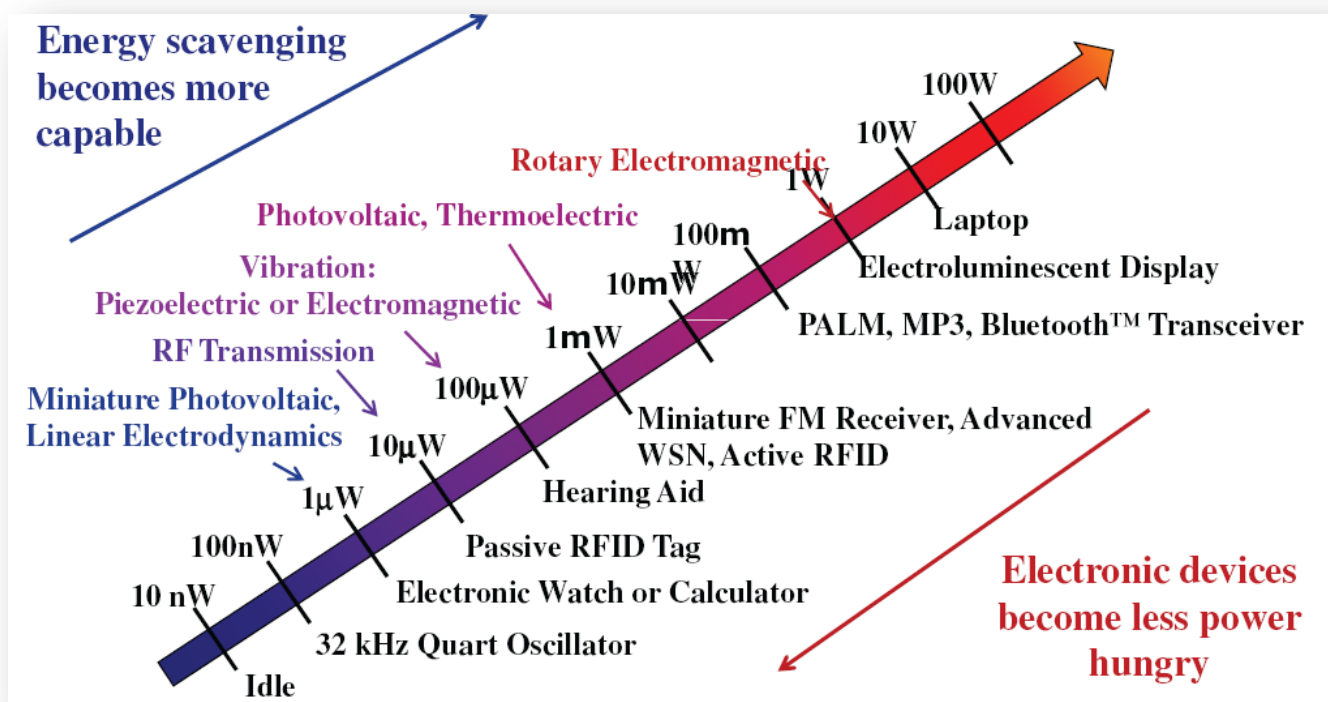
Where to find „free energy“

Typical energy harvester output power

- RF: 0.1 $\mu\text{W}/\text{cm}^2$
- Vibration: 1 mW/cm^2
- Thermal: 10 mW/cm^2
- Photovoltaic: 100 mW/cm^2

Typical energy harvester voltages

- RF: 0.01 mV
- Vibration: 0.1 ~ 0.4 V
- Thermal: 0.02 ~ 1.0 V
- Photovoltaic: 0.5 ~ 0.7 V typ/cell



3-axis accelerometer...

Source: Intel – Kamal Shah - Energy Harvesting Presentation

Energy Harvesting Kit – Demoboard DC2080A

Featuring:

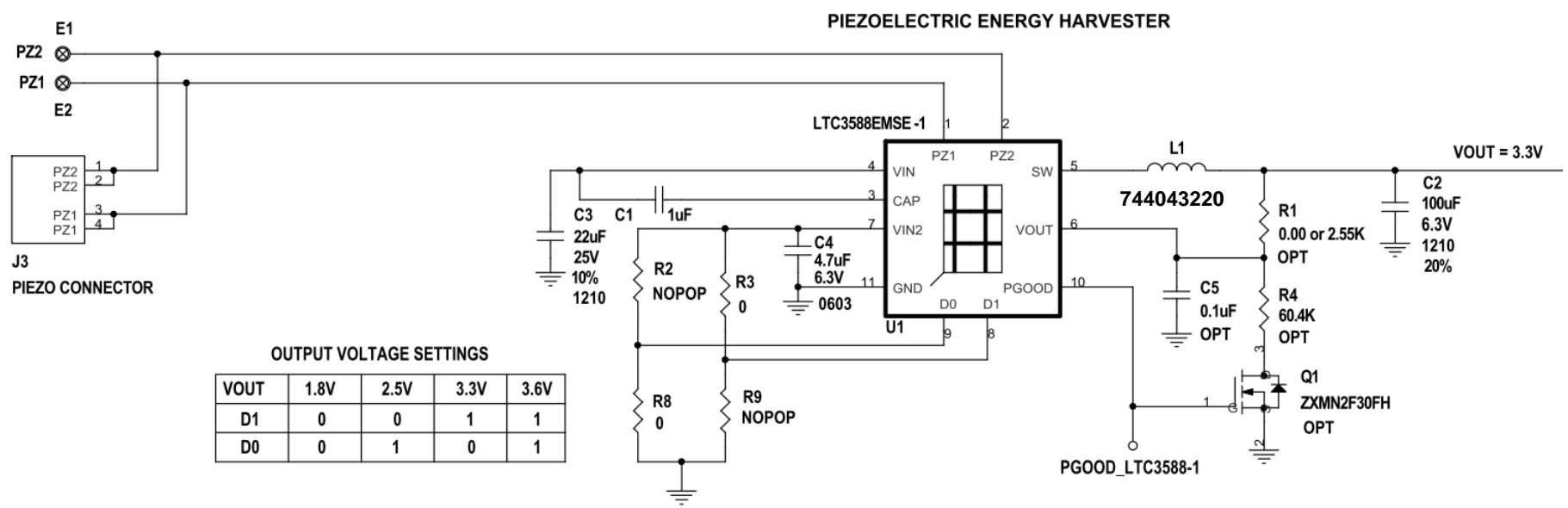
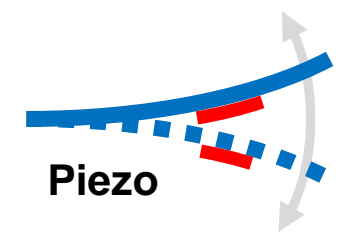
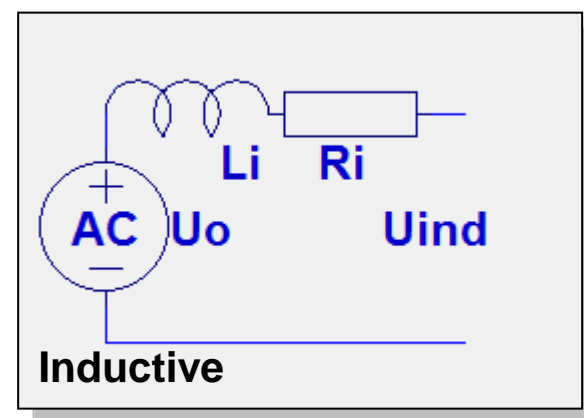
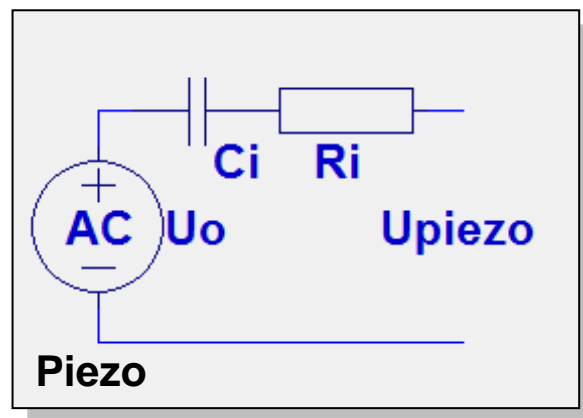
- LTC3588** – Piezo Harvesting
- LTC3108** – TEG Harvesting
- LTC3105** – Diode Drop Supply
- LTC3459** – Solar Harvesting
- LTC2935** – Supervisor/ULVO



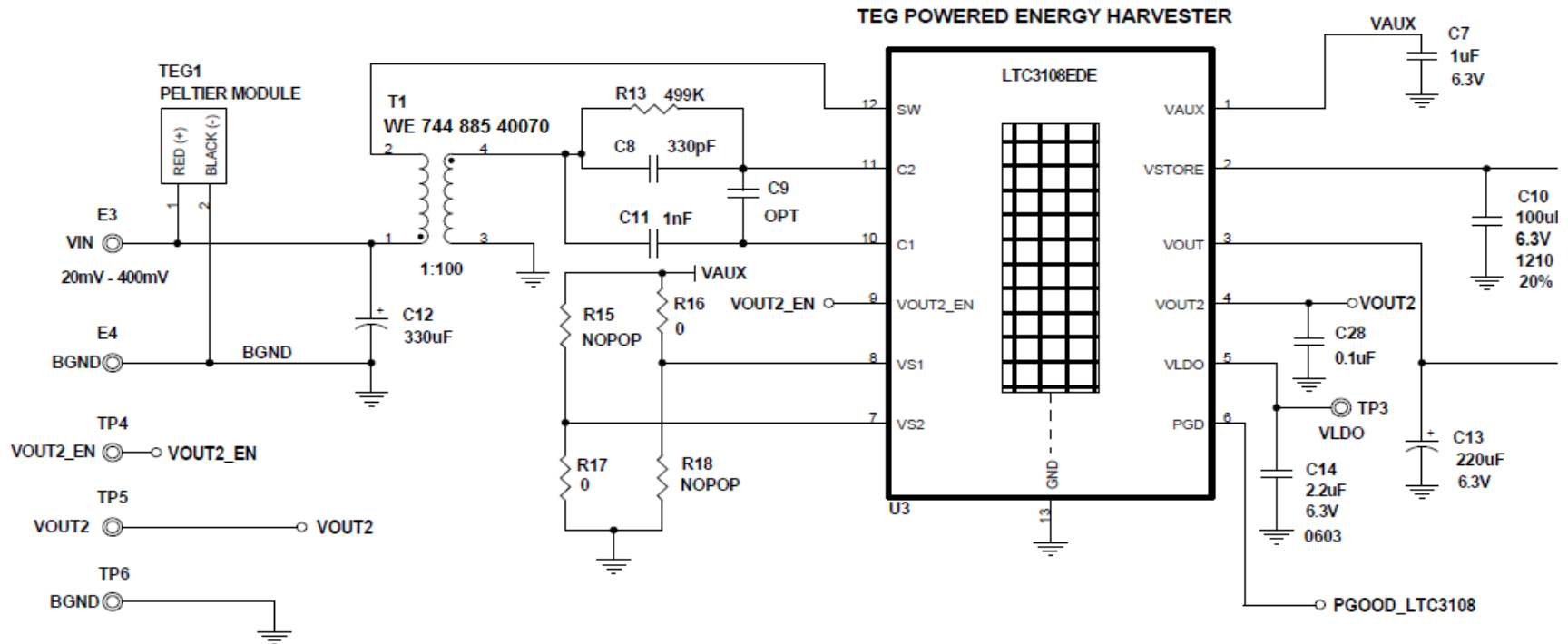
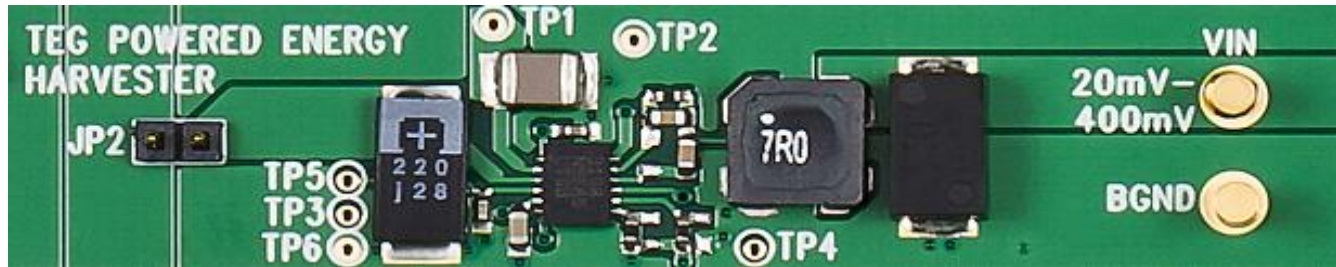
Source: Linear Technology Corporation



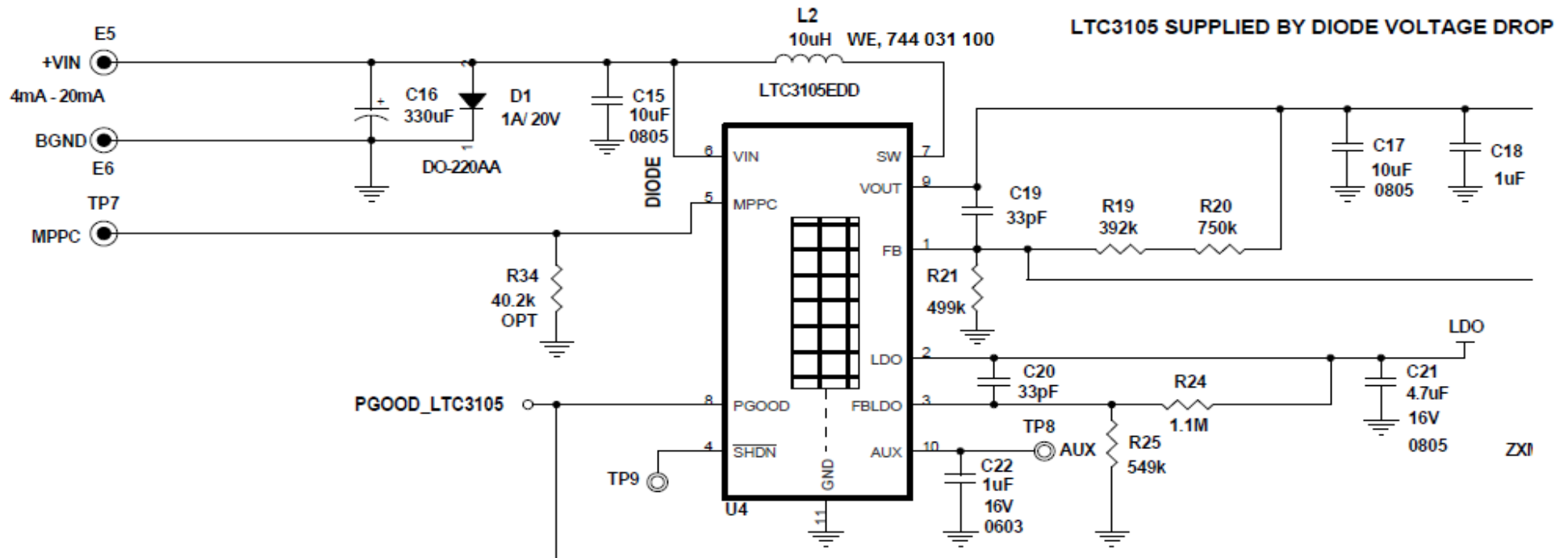
EH-Kit: LTC3588 – Piezo / Inductive



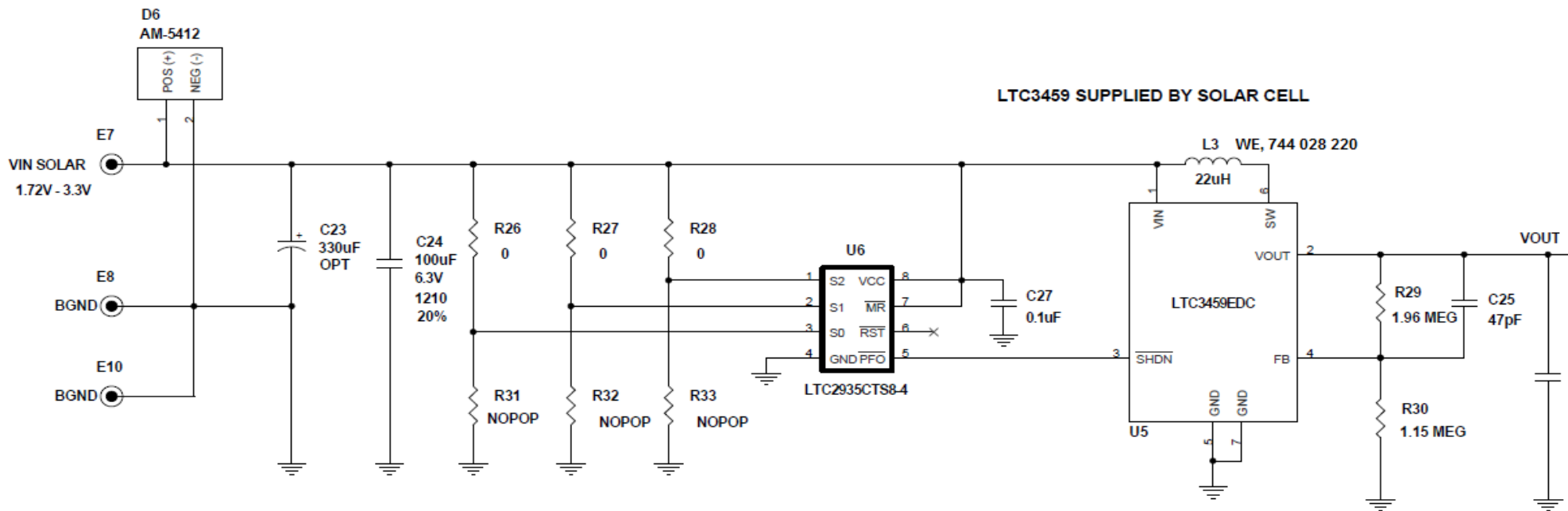
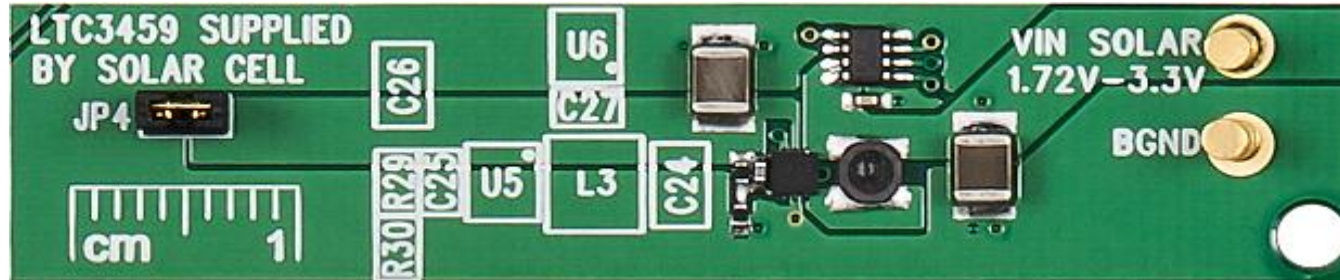
EH-Kit: LTC3108 - TEG



EH-Kit: LTC3105 - Diode Drop

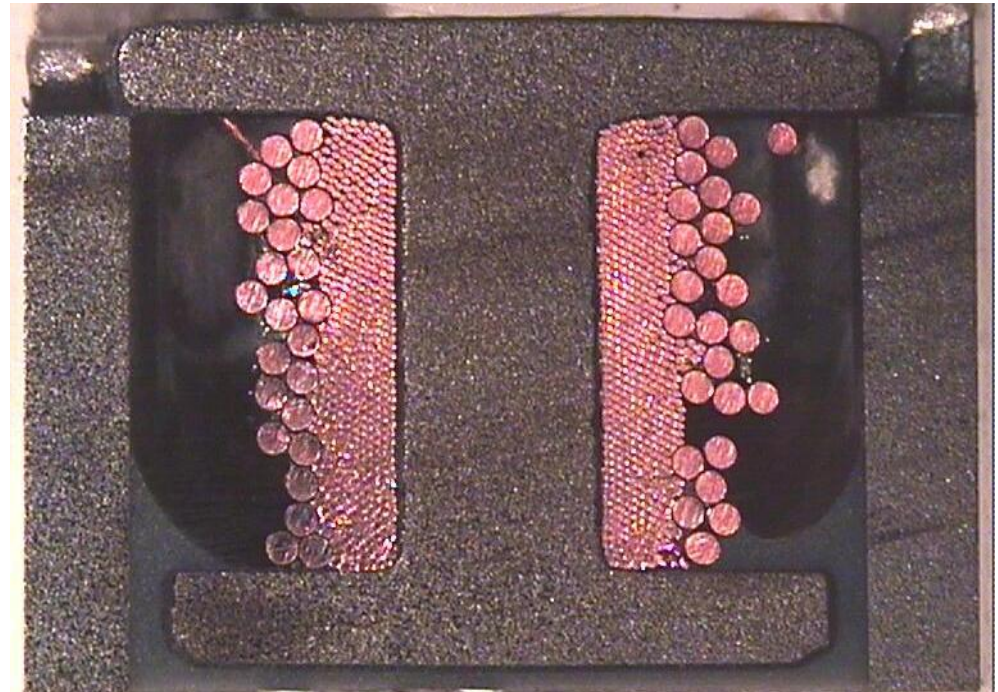
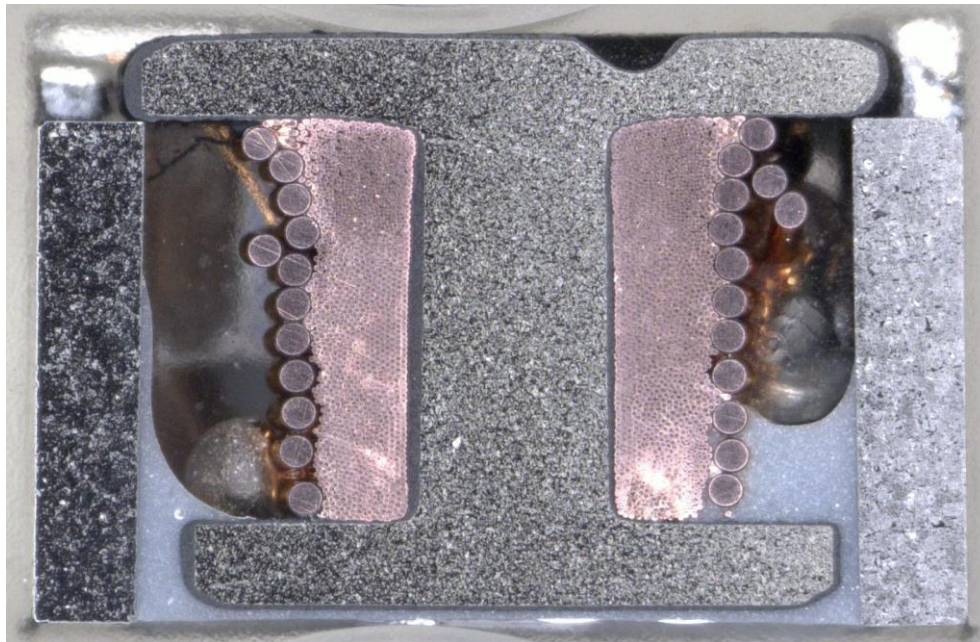


EH-Kit: LTC3459 & LTC2935 – Solar



What is behind the WE-EHP transformer?

- winding style



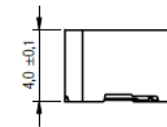
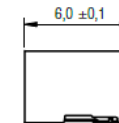
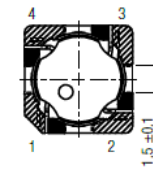


Würth Elektronik eiSos components

WE-EHPI Energy Harvesting Power Inductor



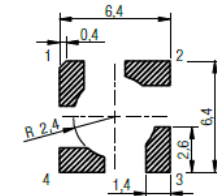
Dimensions (in mm)



Schematic



Land pattern (in mm)



NEW!

Characteristics

- Low profile: 4 mm
- Small footprint 6 x 6 mm
- Very low secondary R_{DC}
- Different turn ratios available
- Separated welding/soldering pad for a high reliable component
- Optimized, high reliable winding style

Applications

- Wireless fire, alarm, gas and metering remote sensors driven by environmental energies based on energy harvesting voltage transformers like LTC3108/LTC3109
- Sensors with predictive battery replacements in applications which are difficult to access
- Energy self-sufficient supply using subsequent installed sensors for energy harvesting

QR-Code



**Optimized for
LTC3108/LTC3109
and more**

Electrical properties

Order Code	$L_1 \pm 20\%$ (μH)	$L_2 \pm 20\%$ (μH)	n	I_{R1} (A)	I_{sat1} (A)	R_{DC1} (Ω)	R_{DC2} (Ω)
744 885 400 70	7.5	75000	1:100	1.9	1.3	0.085	205
744 885 401 20	13.0	33000	1:50	1.7	1.0	0.090	135
744 885 402 50	25.0	10000	1:20	1.5	0.7	0.200	42

Transformer designed on EP7 cores are available on request – Order code: 760370096, 760370097, 760370098

During design stage of this series, we used S11100032, S11100033 & S11100034.
With our standard series we have replaced these order codes.

Let us work together!

Technical Support

- Design Guide “Trilogy of Magnetics”, “Trilogy of Connectors” & „Simulation in LTSpice IV“
- Local support

Design-In Support

- EMC test lab racks
- Reference designs of IC manufacturers
- Toolbox for engineers & purchasers
- Free design program
Component Selector

Delivery

- All products available ex stock
- Within 24 hours
- No MOQ
- Service degree: 98.5 %
- Samples free of charge

Service

- Free technical seminars
- Design Kits with lifelong free refill
- EMC Test lab search engine

Helpful tools for engineers
& purchasers:

www.we-online.com/toolbox



Energy Harvesting To Go Kit



More information at:
www.we-online.com

and at our local distributor:
www.mouser.com