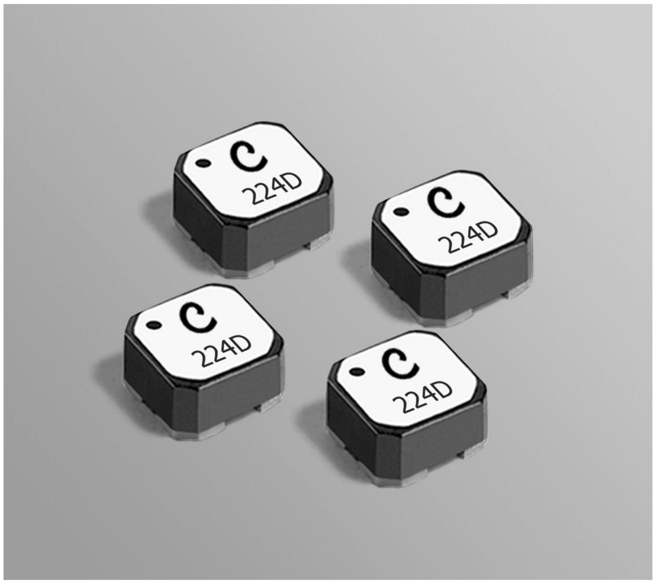
Flyback/Buck Transformer for TI UCC25230 Switching Converter

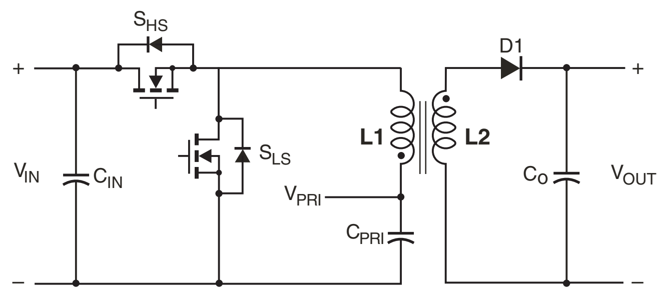


The MA5401-AE was developed for use with the Texas Instruments UCC25230 Switching Converter (12 – 100 V input, 0.20 A output).

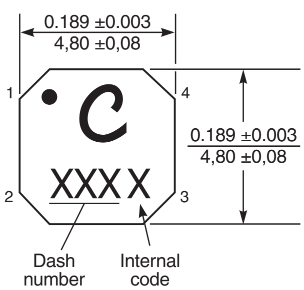
It is designed to meet UL60950 **Functional Isolation** for working voltage up to 210 V peak.

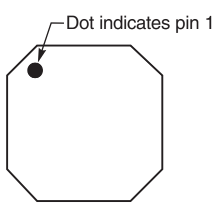
With 1000 Vrms (1500 Vdc) hipot and a small package size, this transformer is ideal for use in high density isolated circuit applications.

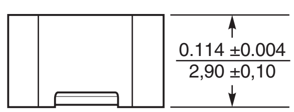
It provides tight coupling (k > 0.99), high inductance and excellent current handling in a rugged, low cost part.



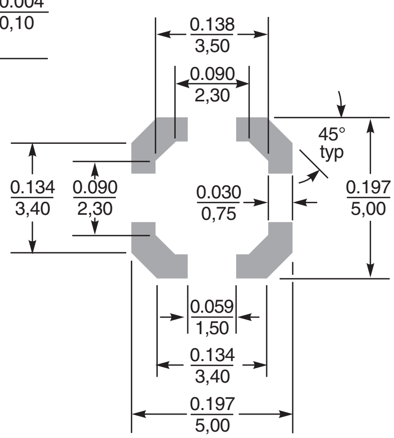
Typical Flyback / Buck Converter

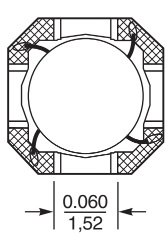


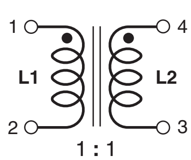




Recommended Land Pattern







Dimensions are in $\frac{\text{inches}}{\text{mm}}$

Core material Ferrite

Environmental RoHS compliant, halogen free

Terminations RoHS compliant silver-palladium-platinum-glass frit. Other terminations available at additional cost.

Weight 210 – 225 mg

Ambient temperature –40°C to +125°C (Ambient temperature + self-heating must not exceed a part temperature of 125°C. See notes for calculating temperature rise due to self-heating.)

Storage temperature Component: –40°C to +125°C. Tape and reel packaging: –40°C to +80°C

Winding to winding isolation 1500 Vdc

Resistance to soldering heat Max three 40 second reflows at +260°C, parts cooled to room temperature between cycles

Moisture Sensitivity Level (MSL) 1 (unlimited floor life at <30°C / 85% relative humidity)

Failures in Time (FIT) / Mean Time Between Failures (MTBF) 38 per billion hours / 26,315,789 hours, calculated per Telcordia SR-332

Packaging 750/7″ reel; 2500/13″ reel Plastic tape: 12 mm wide, 0.32 mm thick, 8 mm pocket spacing, 3.1 mm pocket depth

Recommended pick and place nozzle OD: 5 mm; ID: ≤ 2.5 mm

PCB washing Tested with pure water or alcohol only. For other solvents, see Doc787_PCB_Washing.pdf.

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MA5401-AE for TI UCC25230 Switching Converter

Part number[1]	Inductance[2] ±20% (µH)	DCR max[3] (Ohms)	SRF typ[4] (MHz)	Coupling coefficient typ	Leakage inductance[5] typ (µH)	Isat (A)[6] 10% drop	Isat (A)[6] 20% drop	Isat (A)[6] 30% drop	Hipot[7] (Vdc)
MA5401-AE_	220	5.25	6.5	>0.99	0.541	0.16	0.21	0.24	1500

1. When ordering, please specify **packaging** code:

   MA5401-AEC

   Packaging: **C** = 7″ machine-ready reel. EIA-481 embossed plastic tape (750 parts per full reel).
   B = Less than full reel. In tape, but not machine ready. To have a leader and trailer added ($25 charge), use code letter D instead.
   D = 13″ machine-ready reel. EIA-481 embossed plastic tape. Factory order only, not stocked (2500 parts per full reel).
2. Inductance shown for each winding, measured at 100 kHz, 0.1 Vrms, 0 Adc on an Agilent/HP 4284A LCR meter or equivalent. When leads are connected in parallel, inductance is the same value. When leads are connected in series, inductance is four times the value.
3. DCR is for each winding. When leads are connected in parallel, DCR is half the value. When leads are connected in series, DCR is twice the value.
4. SRF measured using an Agilent/HP 4191A or equivalent. When leads are connected in parallel, SRF is the same value.
5. Leakage Inductance is for L1 and is measured with L2 shorted.
6. DC current, at which the inductance drops the specified amount from its value without current. It is the sum of the current flowing in both windings.
7. Hipot production tested 100% at 1800 Vdc for 2 seconds.
8. Electrical specifications at 25°C.

Refer to Doc 362 “Soldering Surface Mount Components” before soldering.

Temperature rise calculation based on current

Winding power loss = $(I_{L1}^2 + I_{L2}^2) \times$ DCR in Watts (W)

Temperature rise = Winding power loss $\times \frac{157°C}{W}$

Equal current in each winding (0.15 A):

Winding power loss = $(0.15^2 + 0.15^2) \times 5.25 = 0.236$ W

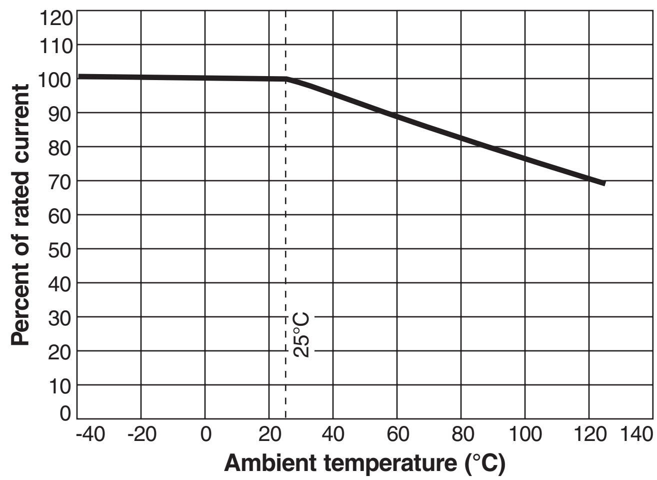
Temperature rise = $0.236\ W \times \frac{157°C}{W} = 37°C$

Unequal current (I_{L1} = 0.21 A, I_{L2} = 0.06 A):

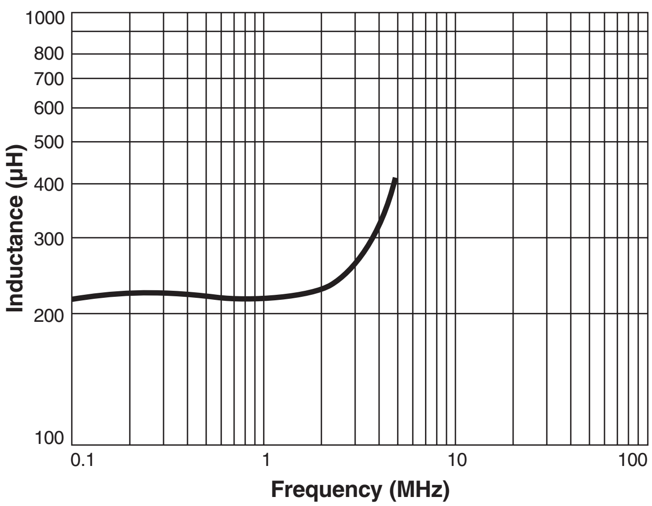
Winding power loss = $(0.21^2 + 0.06^2) \times 5.25 = 0.250$ W

Temperature rise = $0.250\ W \times \frac{157°C}{W} = 39.3°C$

Typical Current Derating



Typical L vs Frequency



Typical L vs Current