| ACDC_LinkSwitchXT2900V_092018; Rev.1.1; Copyright Power Integrations 2018 | INPUT | INFO | OUTPUT | UNIT | ACDC_LinkSwitchXT2 900V Flyback Design Spreadsheet |
|---|---|---|---|---|---|
| ENTER APPLICATION VARIABLES | | | | | Design Title |
| LINE VOLTAGE RANGE | | | Custom | | AC line voltage range |
| VACMIN | 100.00 | | 100.00 | Volts | Minimum AC line voltage |
| VACTYP | | | 115.00 | Volts | Typical AC line voltage |
| VACMAX | 480.00 | | 480.00 | Volts | Maximum AC line voltage |
| fL | | | 50 | Hertz | AC mains frequency |
| TIME_BRIDGE_CONDUCTION | | | 2.59 | mseconds | Input bridge rectifier diode conduction time |
| LINE RECTIFICATION | | | F | | Select 'F'ull wave rectification or 'H'alf wave rectification |
| VOUT | 12.00 | | 12.00 | Volts | Output voltage |
| IOUT | 0.600 | | 0.600 | Amperes | Average output current specification |
| EFFICIENCY | 0.85 | | 0.85 | | Efficiency Estimate at output terminals. Under 0.8 if no better data available |
| LOSS ALLOCATION FACTOR | | | 0.50 | | The ratio of power losses during the MOSFET off-state to the total system losses |
| POUT | | | 7.20 | Watts | Continuous Output Power |
| CIN | | | 15.00 | uFarads | Input capacitor |
| VMIN | | | 106.01 | Volts | Valley of the rectified VACMIN |
| VMAX | | | 678.82 | Volts | Peak of the VACMAX |
| FEEDBACK | BIAS | | BIAS | | Select the type of feedback required. (BIAS = feedback via Bias Winding) |
| BIAS WINDING | YES | | YES | | Select whether a bias winding is required |
| | | | | | |
| | | | | | |
| | | | | | |
| LINKSWITCH-XT2 VARIABLES | | | | | |
| CURRENT LIMIT MODE | | | STD | | Pick between 'RED' (Reduced) or 'STD' (Standard) current limit mode of operation |
| PACKAGE | | | DIP-8C | | Device package |
| ENCLOSURE | | | OPEN FRAME | | Device enclosure |
| GENERIC DEVICE | LNK3696 | | LNK3696 | | Device series |
| DEVICE CODE | | | LNK3696P | | Device code |
| PMAX | | | 8.00 | Watts | Device maximum power capability |
| VOR | 100 | | 100 | Volts | Voltage reflected to the primary winding when the MOSFET is off |
| VDSON | | | 10.0 | Volts | MOSFET on-time drain to source peak voltage |
| VDSOFF | | Warning | 828.8 | Volts | The off-time drain to source voltage is higher than 90% of the device breakdown voltage (900V): decrease the VOR or the maximum line voltage |
| ILIMITMIN | | | 0.446 | Amperes | Minimum current limit |
| ILIMITTYP | | | 0.482 | Amperes | Typical current limit |
| ILIMITMAX | | | 0.518 | Amperes | Maximum current limit |
| FSMIN | | | 62000 | Hertz | Minimum switching frequency |
| FSTYP | | | 66000 | Hertz | Typical switching frequency |
| FSMAX | | | 70000 | Hertz | Maximum switching frequency |
| RDSON | | | 9.70 | Ohms | MOSFET drain to source resistance at 25degC |
| | | | | | |
| | | | | | |
| | | | | | |
| PRIMARY WAVEFORM PARAMETERS | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| MODE OF OPERATION | | | DCM | | Mode of operation |
| KRP/KDP | | | 1.591 | | Measure of continuous/discontinuous mode of operation |
| KP_TRANSIENT | | | 0.760 | | KP under conditions of a transient |
| DMAX | | | 0.396 | | Maximum duty cycle at VMIN |
| TIME_ON | | | 6.381 | useconds | MOSFET conduction time at the minimum line voltage |
| TIME_ON_MIN | | | 0.971 | useconds | MOSFET conduction time at the maximum line voltage |
| IAVG_PRIMARY | | | 0.088 | Amperes | Average input current |
| IRMS_PRIMARY | | | 0.162 | Amperes | Root mean squared value of the primary current |
| LPRIMARY_MIN | | | 1271 | uH | Minimum primary inductance |
| LPRIMARY_TYP | | | 1412 | uH | Typical primary inductance |
| LPRIMARY_MAX | | | 1553 | uH | Maximum primary inductance |
| LPRIMARY_TOL | | | 10 | | Tolerance of the Primary inductance |
| | | | | | |
| | | | | | |
| | | | | | |
| SECONDARY WAVEFORM PARAMETERS | | | | | |
| IPEAK_SECONDARY | | | 4.086 | Amperes | Peak secondary current |
| IRMS_SECONDARY | | | 1.454 | Amperes | Root mean squared value of the secondary current |
| PIV_SECONDARY | | | 98.05 | Volts | Peak inverse voltage on the secondary diode, not including the leakage spike |
| VF_SECONDARY | | | 0.70 | Volts | Secondary diode forward voltage drop |
| | | | | | |
| | | | | | |
| | | | | | |
| TRANSFORMER CONSTRUCTION PARAMETERS | | | | | |
| Core selection | | | | | |
| CORE | EE16 | | EE16 | | Select the transformer core |
| BOBBIN | | | B-EE16-H | | Bobbin name |
| AE | | | 19.20 | mm^2 | Cross sectional area of the core |
| LE | | | 35.00 | mm | Effective magnetic path length of the core |
| AL | | | 1140.0 | nH/(turns^2) | Ungapped effective inductance of the core |
| VE | | | 795.0 | mm^3 | Volume of the core |
| AW | | | 14.76 | mm^2 | Window area of the bobbin |
| BW | | | 8.50 | mm | Width of the bobbin |
| MLT | | | 0.00 | mm | Mean length per turn of the bobbin |
| MARGIN | | | 0.00 | mm | Safety margin |
| | | | | | |
| Primary winding | | | | | |
| NPRIMARY | | | 284 | | PrImary number of turns |
| BMAX_TARGET | | | 1500 | Gauss | Target value of the magnetic flux density |
| BMAX_ACTUAL | | | 1341 | Gauss | Actual value of the magnetic flux density |
| BAC | | | 671 | Gauss | AC flux density |
| ALG | | | 18 | nH/T^2 | Gapped core effective inductance |
| LG | | | 1.357 | mm | Core gap length |
| LAYERS_PRIMARY | | | 7 | | Number of primary layers |
| AWG_PRIMARY | | | 34 | | Primary winding wire AWG |
| OD_PRIMARY_INSULATED | | | 0.196 | mm | Primary winding wire outer diameter with insulation |
| OD_PRIMARY_BARE | | | 0.160 | mm | Primary winding wire outer diameter without insulation |

| | | | | | |
|---|---|---|---|---|---|
| CMA_PRIMARY | | | 245 | mil^2/Amperes | Primary winding wire CMA |
| | | | | | |
| Secondary winding | | | | | |
| NSECONDARY | | | 36 | | Secondary turns |
| AWG_SECONDARY | | | 25 | | Secondary winding wire AWG |
| OD_SECONDARY_INSULATED | | | 0.760 | mm | Secondary winding wire outer diameter with insulation |
| OD_SECONDARY_BARE | | | 0.455 | mm | Secondary winding wire outer diameter without insulation |
| CMA_SECONDARY | | | 220 | mil^2/Amperes | Secondary winding CMA |
| | | | | | |
| Bias winding | | | | | |
| NBIAS | 36 | | 36 | | Bias turns |
| VF_BIAS | | | 0.70 | Volts | Bias diode forward voltage drop |
| VBIAS | | | 12.70 | Volts | Bias winding voltage |
| PIVB | | | 98.75 | Volts | Peak inverse voltage on the bias diode |
| CBP | | | 0.1 | uF | BP pin capacitor |
| | | | | | |
| | | | | | |
| | | | | | |
| FEEDBACK PARAMETERS | | | | | |
| DIODE_BIAS | | | 1N4003-4007 | | Recommended diode is 1N4003. Place diode on return leg of bias winding for optimal EMI |
| RUPPER | | | 16200 | ohms | CV bias resistor for CV/CC circuit. See LinkSwitch-XT2 Design Guide |
| RLOWER | | | 3000 | ohms | Resistor to set CC linearity for CV/CC circuit. See LinkSwitch-XT2 900V Design Guide |
| | | | | | |
| | | | | | |
| | | | | | |
| MULTIPLE OUTPUT PARAMETERS | | | | | |
| Output 1 | | | | | |
| VOUT1 | | | 12.00 | Volts | Output Voltage 1 |
| IOUT1 | | | 0.600 | Amperes | Output Current 1 |
| POUT1 | | | 7.20 | Watts | Output Power 1 |
| VD1 | | | 0.70 | Volts | Secondary diode forward voltage drop for output 1 |
| NS1 | | | 36 | | Number of turns for output 1 |
| ISRMS1 | | | 1.454 | Amperes | Root mean squared value of the secondary current for output 1 |
| IRIPPLE1 | | | 1.325 | Amperes | Current ripple on the secondary waveform for output 1 |
| PIV1 | | | 98.05 | Volts | Peak inverse voltage on the secondary diode for output 1 |
| DIODE1_RECOMMENDED | | | BYV27-200 | | Recommended diode for output 1 |
| PRELOAD | | | 4.02 | kohms | Preload resistor to ensure a load of at least 3mA on the first output for BIAS, 2mA for MAIN |
| CMS1 | | | 290.8 | Cmils | Bare conductor effective area in circular mils for output 1 |
| AWGS1 | | | 25 | AWG | Wire size for output 1 |
| | | | | | |
| Output 2 | | | | | |
| VOUT2 | | | 0.00 | Volts | Output Voltage 2 |
| IOUT2 | | | 0.000 | Amperes | Output Current 2 |
| POUT2 | | | 0.00 | Watts | Output Power 2 |
| VD2 | | | 0.70 | Volts | Secondary diode forward voltage drop for output 2 |

| | | | | | |
|---|---|---|---|---|---|
| *NS2* | | | *2* | | *Number of turns for output 2* |
| *ISRMS2* | | | *0.000* | *Amperes* | *Root mean squared value of the secondary current for output 2* |
| *IRIPPLE2* | | | *0.000* | *Amperes* | *Current ripple on the secondary waveform for output 2* |
| *PIV2* | | | *4.78* | *Volts* | *Peak inverse voltage on the secondary diode for output 2* |
| *DIODE2_RECOMMENDED* | | | *NA* | | *Recommended diode for output 2* |
| *CMS2* | | | *0.0* | *Cmils* | *Bare conductor effective area in circular mils for output 2* |
| *AWGS2* | | | *0* | *AWG* | *Wire size for output 2* |
| | | | | | |
| *Output 3* | | | | | |
| *VOUT3* | | | *0.00* | *Volts* | *Output Voltage 3* |
| *IOUT3* | | | *0.000* | *Amperes* | *Output Current 3* |
| *POUT3* | | | *0.00* | *Watts* | *Output Power 3* |
| *VD3* | | | *0.70* | *Volts* | *Secondary diode forward voltage drop for output 3* |
| *NS3* | | | *2* | | *Number of turns for output 3* |
| *ISRMS3* | | | *0.000* | *Amperes* | *Root mean squared value of the secondary current for output 3* |
| *IRIPPLE3* | | | *0.000* | *Amperes* | *Current ripple on the secondary waveform for output 3* |
| *PIV3* | | | *4.78* | *Volts* | *Peak inverse voltage on the secondary diode for output 3* |
| *DIODE3_RECOMMENDED* | | | *NA* | | *Recommended diode for output 3* |
| *CMS3* | | | *0.0* | *Cmils* | *Bare conductor effective area in circular mils for output 3* |
| *AWGS3* | | | *0* | *AWG* | *Wire size output for 3* |
| | | | | | |
| *PO_TOTAL* | | | *7.20* | *Watts* | *Total power of all outputs* |
| *NEGATIVE OUTPUT* | | | *N/A* | | *If negative output exists, enter the output number; e.g. If VO2 is negative output, select 2* |
| | | | | | |
| | | | | | |