

TLK110 Customer EVM

This user's guide details the design and operation of the evaluation module (EVM) for the TLK110.

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1 TLK110 EVM Purpose and Content

The purpose of the Industrial Ethernet TLK110CUSEVM is to provide Texas Instruments customers a platform to quickly design and market systems containing the TLK110 device. Customers are encouraged to copy EVM components to expedite their design process. The TLK110CUSEVM operates with only a single voltage (5V from the MII). All other voltages are internally produced.

The EVM kit contains:

- TLK110CUSEVM unit
- Printed copy of this user's guide
- TLK110CUSEVM schematic

2 Information and Specifications

This section contains the specifications of the TLK110CUSEVM card, as well as a description of the card's interfaces, connectors, jumpers, and LEDs.

2.1 Usage Setup and Configuration

Power for the TLK110CUSEVM is supplied via a MII connector.

- If 5V is supplied, the on-board voltage regulator, U1, will convert 5V to 3.3V for the device.
- If 3.3V is supplied from the MII connector, R59 should be assembled and R56 should be removed.
- Make sure the J2 jumper is installed in order to supply 3.3V to the magnetic CT.
- Make sure J1 jumper is installed and configured to MII or RMII.

2.2 Address Settings

The PMD address TLK110CUSEVM Physical Layer device is set by the following jumpers:

- J7: PHY ID [0]
- J6: PHY ID [1]
- J5: PHY ID [2]

The default board setting for the PHY address is 01h. The board may be set to any PHY address 00h - 07h by adding jumpers J5 - J7.

2.3 TLK110CUSEVM Connections

Table 1 describes the connections of the TLK110CUSEVM.

Table 1. TLK110CUSEVM Connections

| Jumper | Name | Function |
|---------------------|------------------------------|---|
| P1 | MII male connector | MII interface |
| J1 | MII or RMII selector | Select between MII mode or RMII mode |
| J14 | RESET N | Reset the device |
| J2 | Central tap voltage selector | Enable 3.3V supply to the central tap |
| U2 | RJ45 | RJ45 ethernet connector |
| J5 - J7 | PHY ID[0:2] | Configure PHY ID address (default = addr 01h) |
| J15 (Not populated) | 25M out | 25M clock output |
| J10 | RMII enable | Enable RMII (default = MII) |
| J8 | CFG CROSSOVER | Disable AMDIX (default = AMDIX ON) |
| J3 | CFG ANEG MODE | See description below |
| J4 | AFG ANEG SPD 0 | See description below |
| J5 | AFG ANEG SPD 1 | See description below |

Table 2. TLK110CUSEVM Aneg Modes Connections

| AN-EN | AN_1 | AN_0 | Forced Mode |
|-------|------|------|--------------------------|
| 0 | 0 | 0 | 10BT, Half duplex |
| 0 | 0 | 1 | 10BT, Full duplex |
| 0 | 1 | 0 | 100BT, Half duplex |
| 0 | 1 | 1 | 100BT, Full duplex |
| AN-EN | AN_1 | AN_0 | Advertised Mode |
| 1 | 0 | 0 | 10BT, Half/Full duplex |
| 1 | 0 | 1 | 100BT, Half/Full duplex |
| 1 | 1 | 0 | 10BT, 100BT, Half duplex |
| 1 | 1 | 1 | 10BT, 100BT, Full duplex |

3 TLK110CUSEVM Specification

3.1 Overview

The TLK110CUSEVM is a Texas Instruments platform that allows a customer to evaluate the TLK110 device and demonstrate the advanced features specified in the TLK110 datasheet.

The EVM supports 10/100 Base-T and is IEEE 802.3 standard compliant.

The TLK110CUSEVM operates with a single supply (5V or 3.3V) from the MII. All other voltages required for the TLK110 are internally generated in the device.

The TLK110CUSEVM is designed to work in industrial temperatures.

3.2 Required Resources

Any equipment that provides a standard IEEE 802.3, Clause 22 MII DTE interface; e.g. SmartBits/Netcom box.

3.3 Features

The TLK110CUSEVM features include:

- Industrial temperatures (-40°C to 85°C)
- Industrial temperature external magnetics
- Control and status:
 - Configurable 8 PHY Addresses – 01h (default) or any other address between 00h - 07h using jumpers as describes in [Table 1](#)
 - 8 LEDs – 2 power, 6 status LEDs (speed, link, and active data)
- Strap options:
 - MII/RMII jumper (MII disable)
 - Resistor strapping options:
 - Configurable PHY addresses 08h - 31h
 - CFG_ANEG_MODE
 - CFG_ANAEG_SPD_0 ,1
 - CFG_CROSSOVER
 - RESET_N jumper
- Connections for the following interfaces:
 - MII connector
 - RJ-45 connector
- Single sided component placement
- On-board clock – crystal/oscillator dual footprint
- On-board power supplied by MII connector only, resistors to configure 5V or 3.3V operation

3.4 TLK110CUSEVM Block Diagram

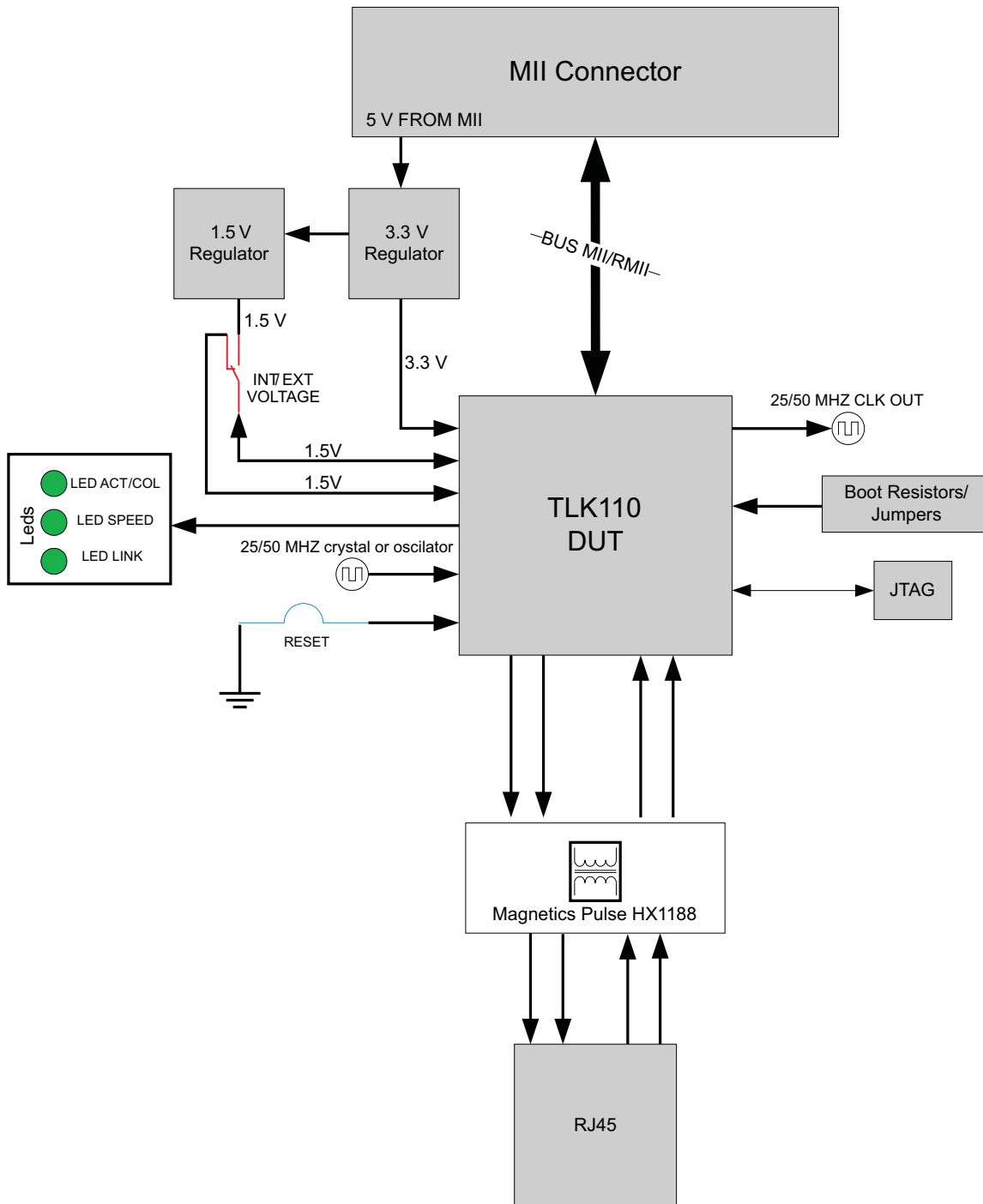


Figure 1. EVM Block Diagram

3.5 PCB Physical Layout

- FR4 material
- Trace impedance differential impedance 100 Ω, ±5%
- Uniform supply and ground planes
- 4 layers
- Combination of through-hole and surface mount technology

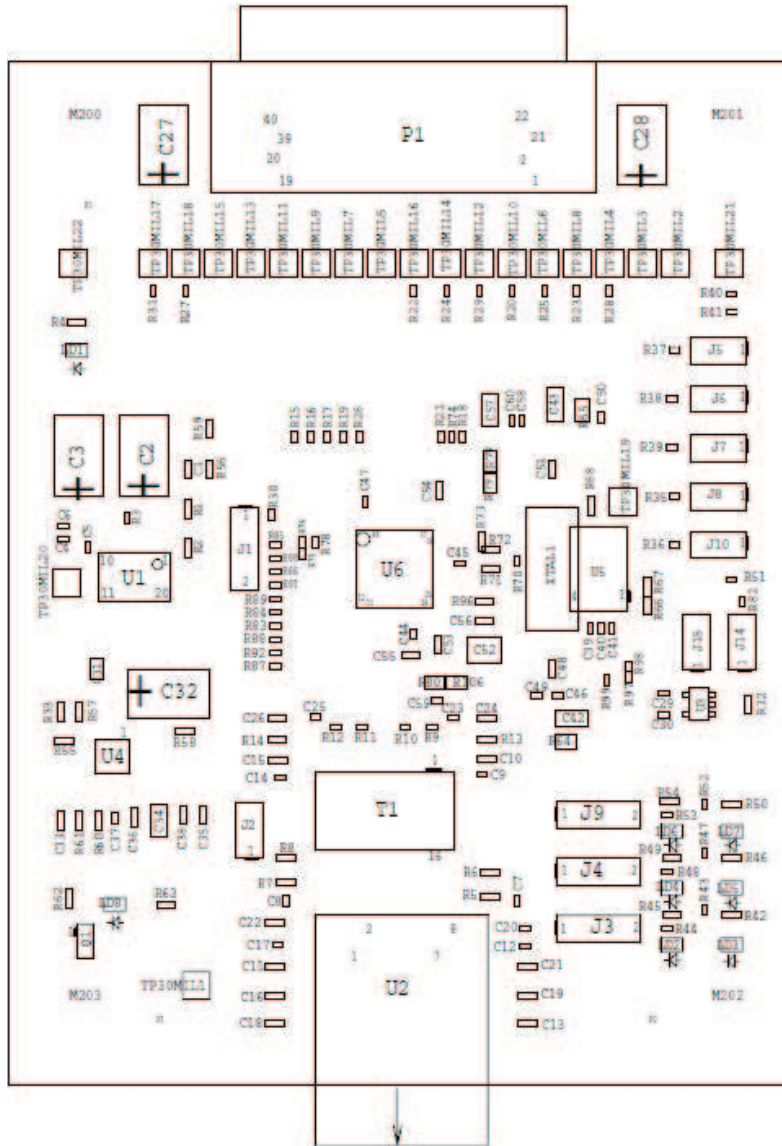


Figure 2. EVM Layout

3.6 EVM Schematics

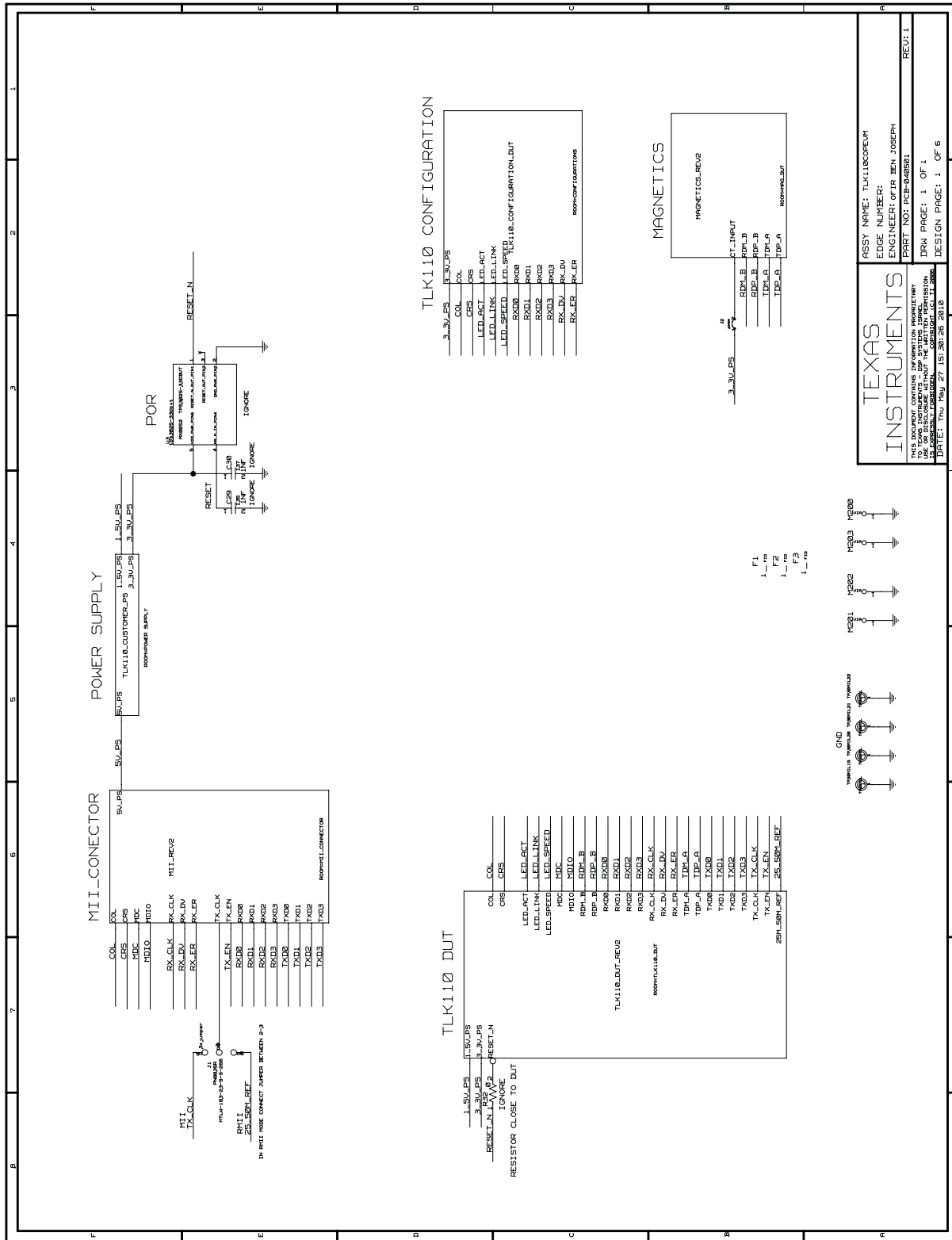


Figure 3. TLK110CUSEVM Top Level Schematics

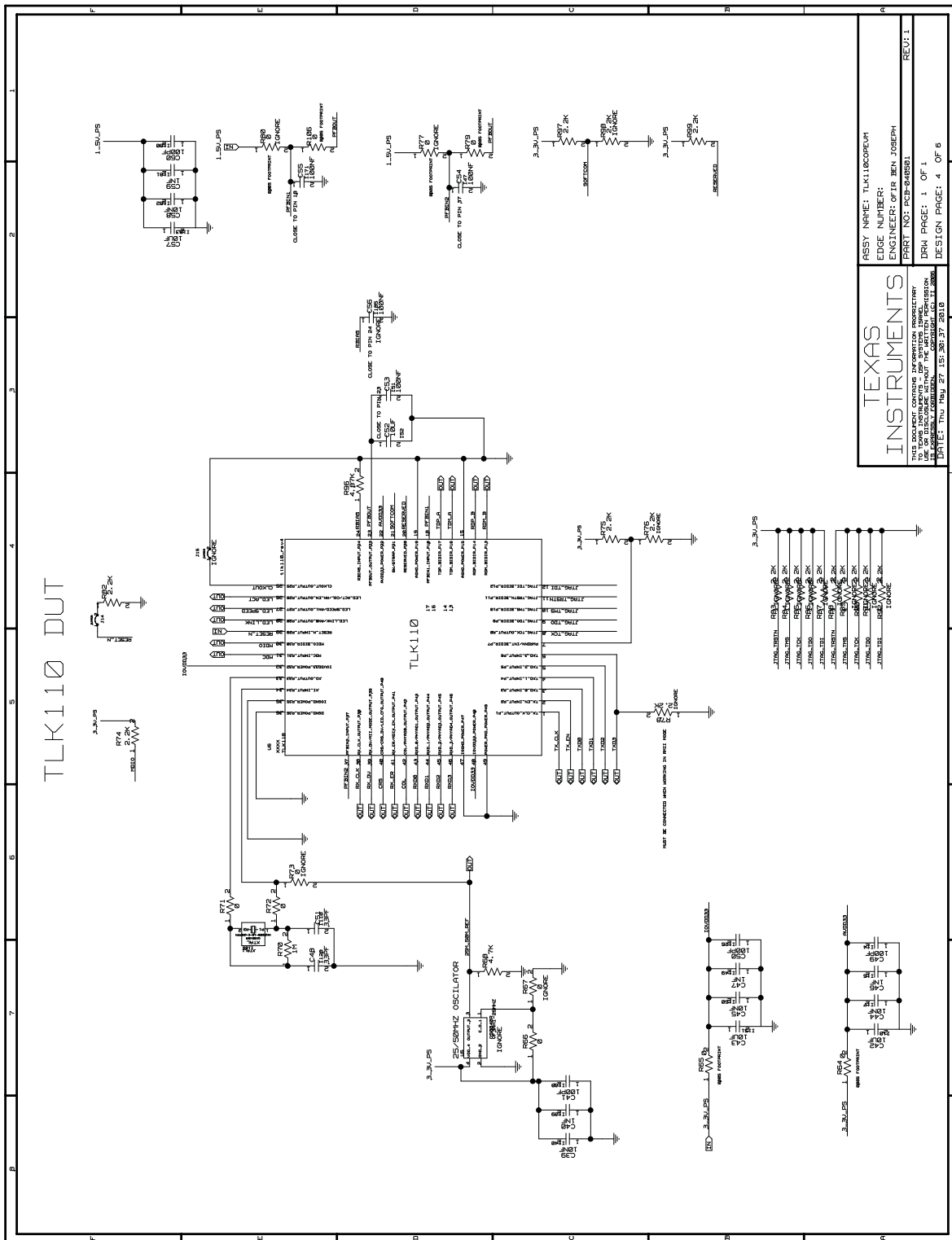
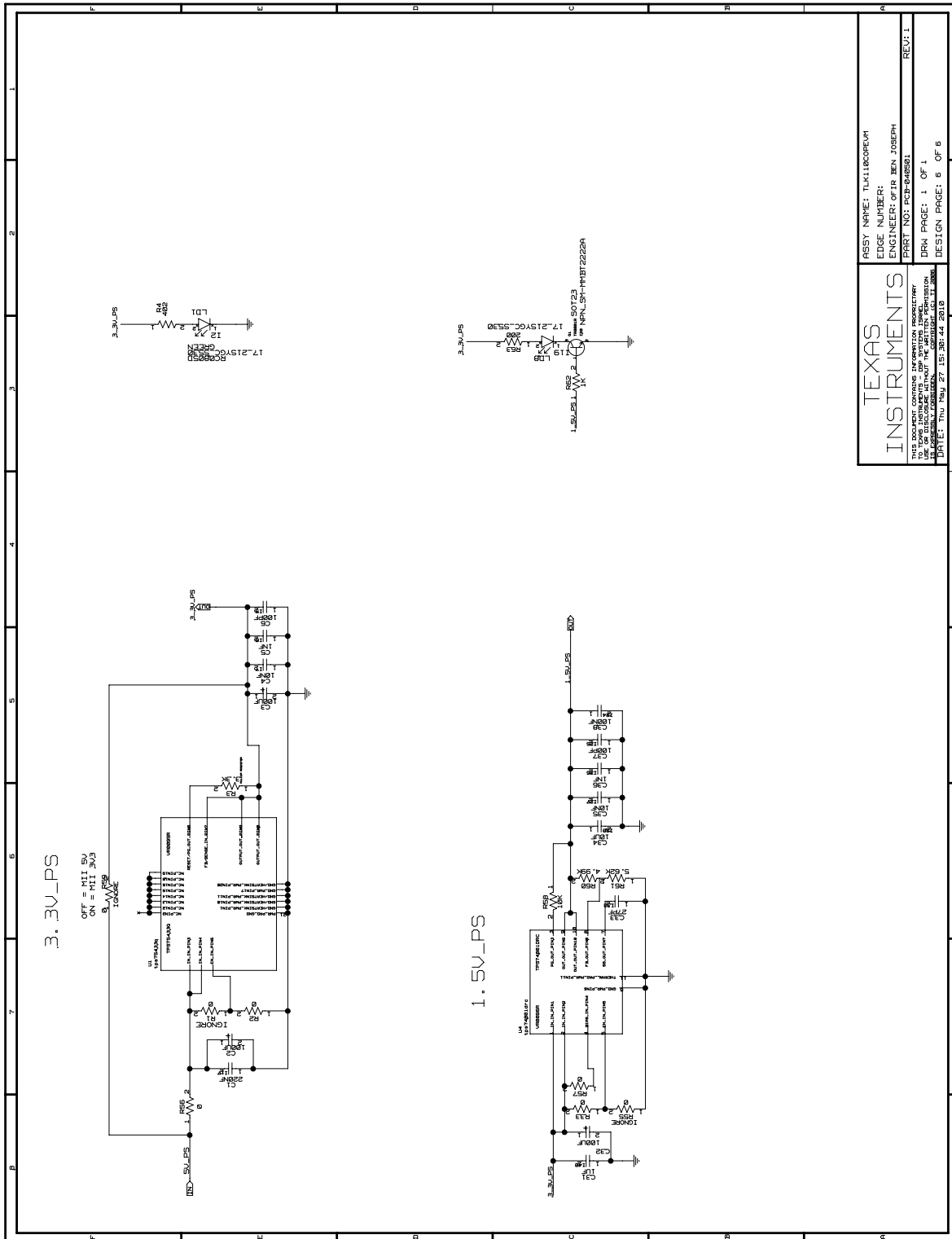
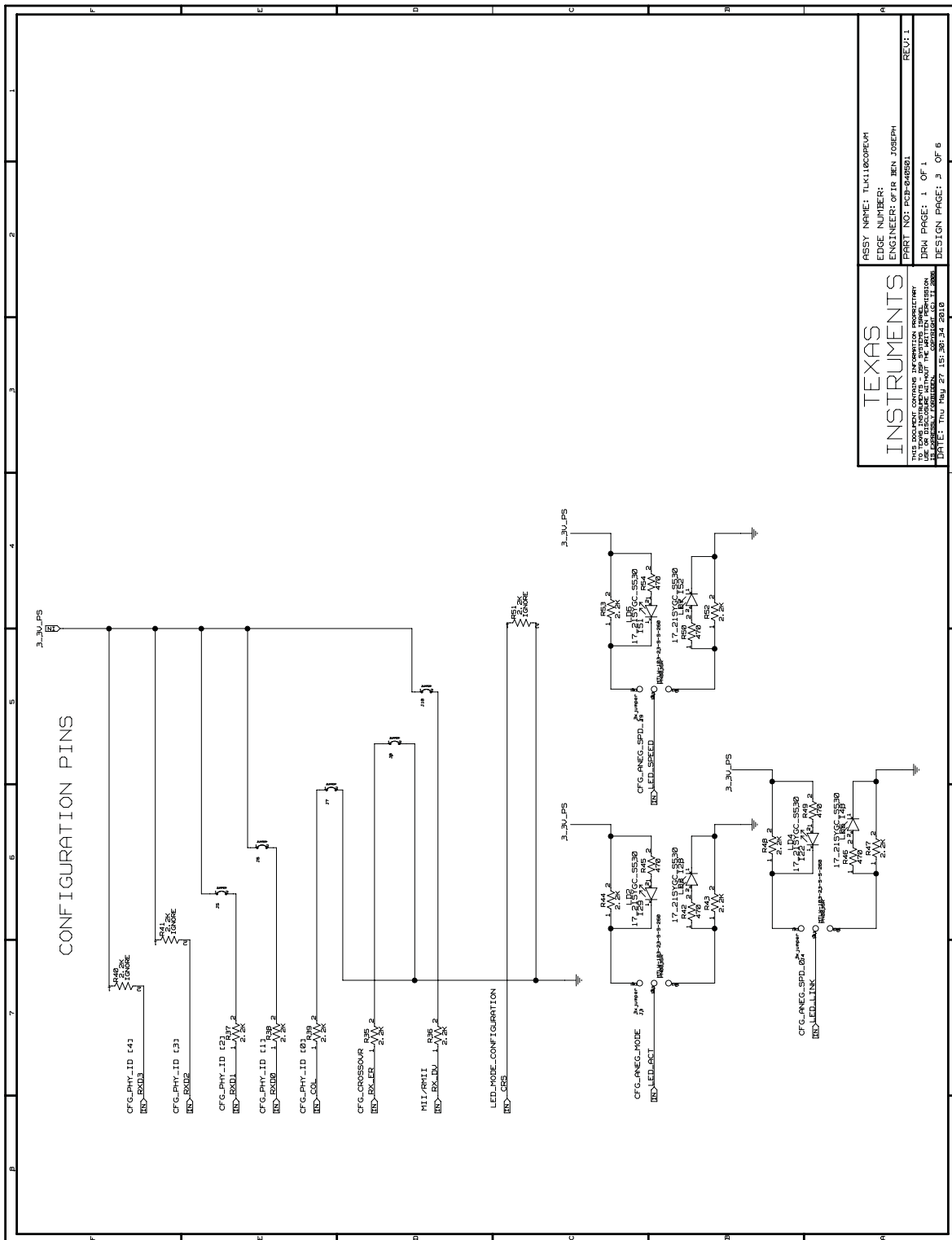


Figure 4. TLK110CUSEVM / TLK110 Schematics



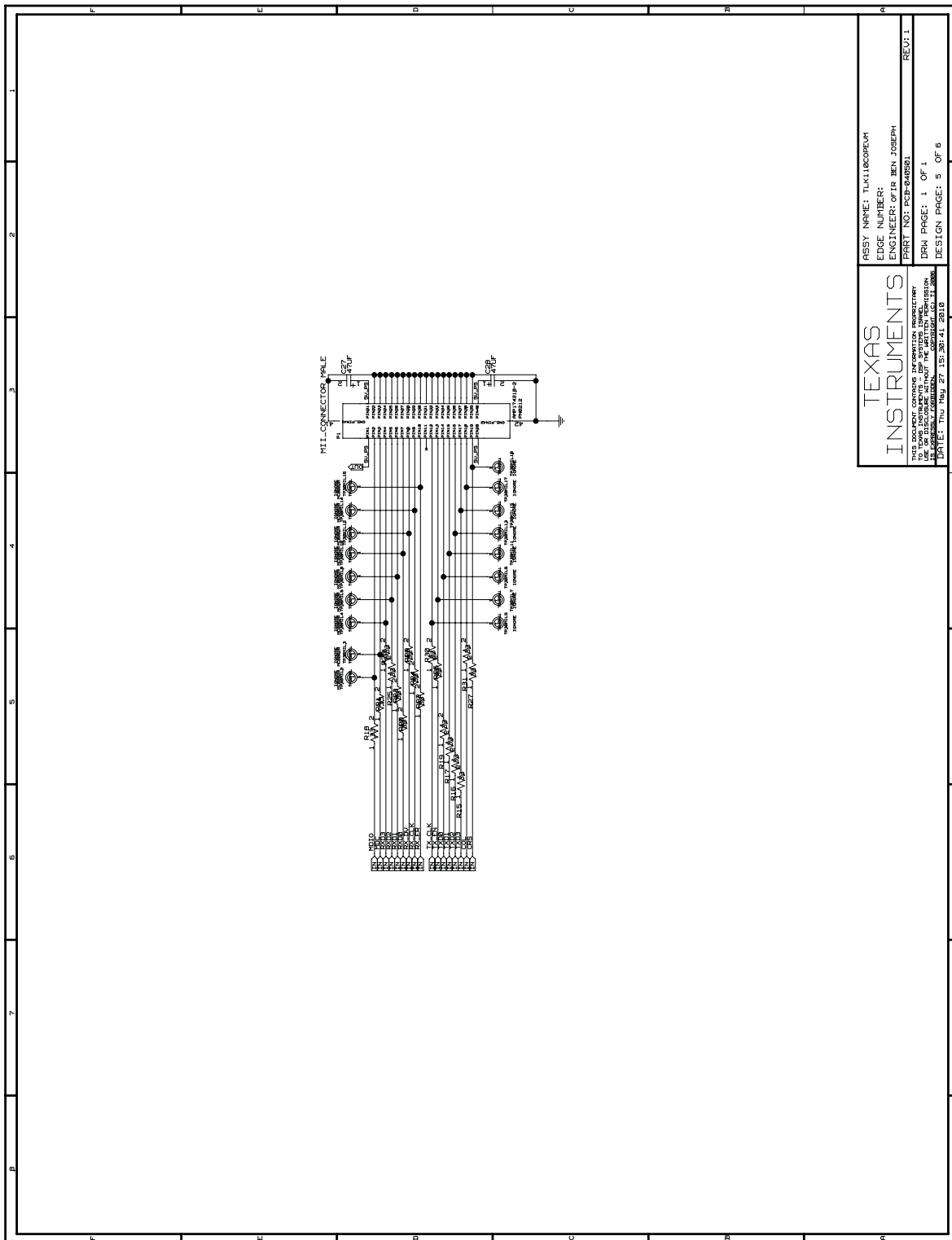
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| | DRAW PAGE: 1 OF 1 DESIGN PAGE: 5 OF 5 |

Figure 5. TLK110CUSEVM 3.3V/1.5V LDO Schematics



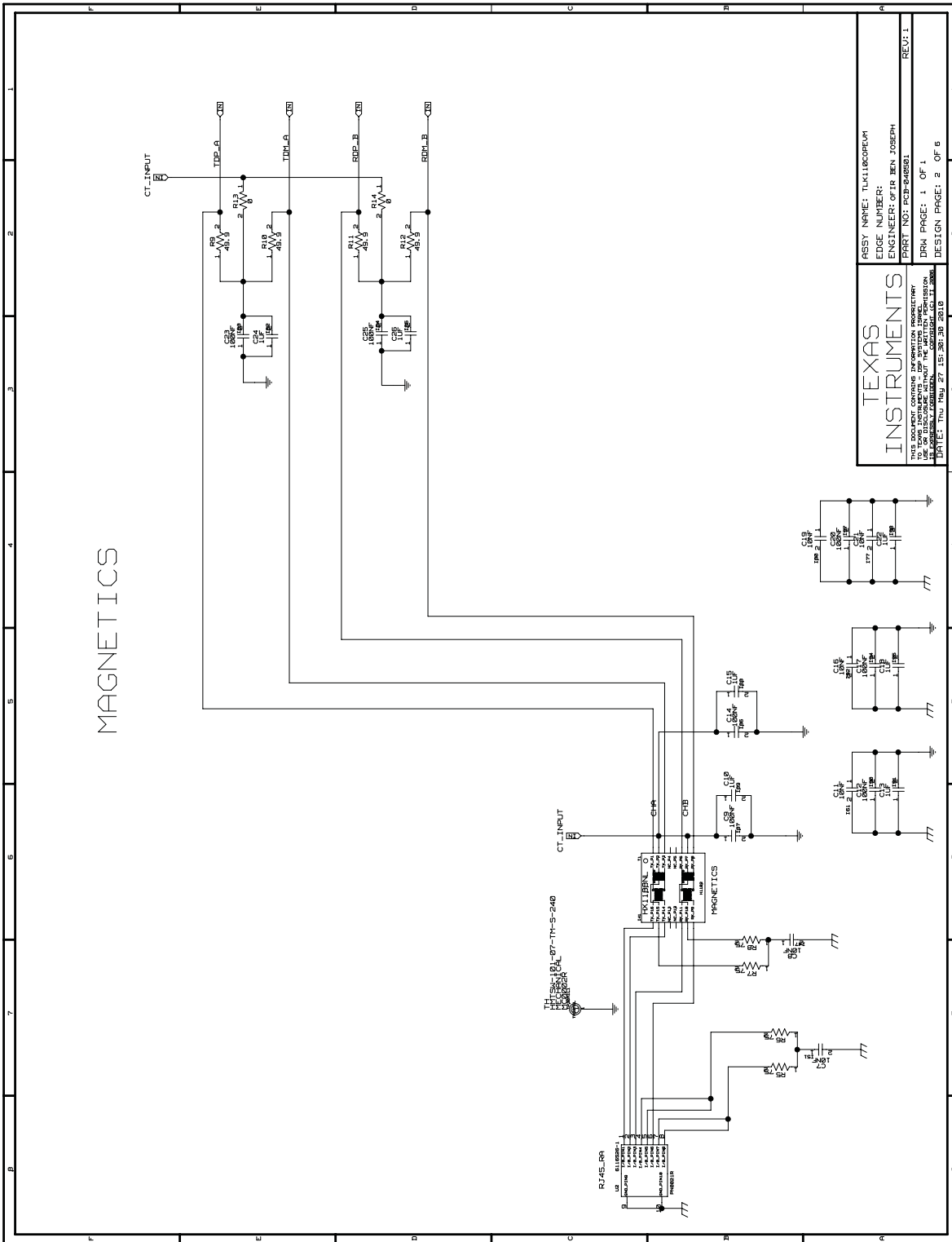
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| | REV: 1 DRAW PAGE: 1 OF 1 DESIGN PAGE: 3 OF 5 |

Figure 6. TLK110CUSEVM / SOR Schematics



| | |
|--|--|
| TEXAS INSTRUMENTS | ASSY NAME: TLK110CUSEVM EDGE NUMBER: ENGINEER: OFIR BEN JOSEPH |
| | PART NO: PCB-2445501 DRAW PAGE: 1 OF 1 DESIGN PAGE: 5 OF 5 |
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Figure 7. TLK110CUSEVM / MII Connector Schematics



| | |
|---|---|
| TEXAS INSTRUMENTS | ASSY NAME: TLK110CUSEVM EDGE NUMBER: ENGINEER: OFIR BEN JOSEPH PART NO: PCB-244501 DATE: Thu May 27 15:26:38 2011 |
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Figure 8. TLK110CUSEVM / Magnetics Schematics

3.7 Bill of Materials

Table 3. Bill of Materials

| Part Name | Ref Des | Qty | JEDEC Type | Part No. | Vendor | Vendor Part No. | Value | BOM Ignore | Description | New Part No. |
|---|--------------------------------|-----|------------|----------|---------------|---------------------|-------|------------|--|--------------|
| 3XJUMPER_MECHANICAL | J1,J3,J4,J9 | 4 | JUMPERX3 | PN0035R | SAMTEC | MTLW-103-23-S-S-260 | ? | ? | JUMPERX3 MALE | CON-103260R |
| 8_POS_TH_MEC-PN0021R,8POS,6116526-1 | U2 | 1 | 8POS | PN0021R | AMP-TYCO | 6116526-1 | ? | ? | RJ45 CAT5 8 POS RA Female | CON-111031R |
| CAPACITOR_SINGLE-CP0042,100NF,10V,10%,10%,RC0402,GMC04X7R104K10NT | C9,C12,C14,C17,C20,C23,C25 | 7 | RC0402 | CP0042 | CALCHIP | GMC04X7R104K10NT | 100NF | ? | 100NF_X7R_10V_10%_0402 | CAT-400134R |
| CAPACITOR_SINGLE-CP0044,10NF,50V,10%,10%,RC0603,VJ0603Y103KXAT | C11, C16, C19, C21, C35 | 5 | RC0603 | CP0044 | VITRAMON | VJ0603Y103KXAT | 10NF | ? | 10NF_X7R_50V_10%_0603 | CAP-601036R |
| CAPACITOR_SINGLE-CP0046,1NF,50V,5%,5%,RC0603,CL10B102JBNC | C36 | 1 | RC0603 | CP0046 | SAMSUNG | CL10B102JBNC | 1NF | ? | 1NF_X7R_50V_5%_0603 | CAP-600106R |
| CAPACITOR_SINGLE-CP0067,10UF,35V,20%,20%,1206,CE_GMK325_F106ZHT | C34,C42,C43,C57 | 4 | 1206 | CP0067 | TAIYO_YUDEN | CE_GMK325_F106ZHT | 10UF | ? | 10UF_Y5V_35V_20%_1206 | CAP-401010R |
| CAPACITOR_SINGLE-CP0105,100NF,16V,10%,10%,0603,CL10B104KONC | C38,C53-C55 | 4 | 603 | CP0105 | SAMSUNG | CL10B104KONC | 100NF | ? | 100NF_X7R_16V_10%_0603 | CAP-400136R |
| CAPACITOR_SINGLE-CP0105,100NF,16V,10%,10%,0603,CL10B104KONC | C56 | 1 | 603 | CP0105 | SAMSUNG | CL10B104KONC | 100NF | IGNORE | 100NF_X7R_16V_10%_0603 | CAP-400136R |
| CAPACITOR_SINGLE-CP0120,1UF,16V,80%,20%,0805,ECJ2VF1C105Z | C31 | 1 | 805 | CP0120 | PANASONIC | ECJ2VF1C105Z | 1UF | ? | 1UF_Y5V_16V_+80%_-20%_0805 | CAP-300108R |
| CAPACITOR_SINGLE-CP0135,1NF,25V,5%,5%,0402,VJ0402Y102JXXA | C29,C30 | 2 | 402 | CP0135 | VITRAMON | VJ0402Y102JXXA | 1NF | IGNORE | 1NF_X7R_25V_5%_0402 | CAS-600104R |
| CAPACITOR_SINGLE-CP0135,1NF,25V,5%,5%,0402,VJ0402Y102JXXA | C5,C40,C46,C47,C59 | 5 | 402 | CP0135 | VITRAMON | VJ0402Y102JXXA | 1NF | ? | 1NF_X7R_25V_5%_0402 | CAS-600104R |
| CAPACITOR_SINGLE-CP0136,27PF,50V,1%,1%,0603,0603N270F500NT | C33 | 1 | 603 | CP0136 | HITANO | 0603N270F500NT | 27PF | ? | 27PF_NPO_50V_1%_0603 | CAP-902716R |
| CAPACITOR_SINGLE-CP0146,10NF,50V,5%,5%,0402,CL05B103JBNC | C4,C7,C8,C39,C44,C45,C58 | 7 | 402 | CP0146 | SAMSUNG | CL05B103JBNC | 10NF | ? | 10NF_X7R_50V_5%_0402 | CAS-601034R |
| CAPACITOR_SINGLE-CP0147R,100PF,50V,5%,5%,RC0402,VJ0402A101JXAT | C6,C37,C41,C49,C50,C60 | 6 | RC0402 | CP0147R | VITRAMON | VJ0402A101JXAT | 100PF | ? | 100PF_NPO_50V_5%_0402 | CAP-910004R |
| CAPACITOR_SINGLE-CP0221,1UF,6.3V,15%,15%,0603,ECJ1VB0J105K | C10,C13,C15,C18, C22, C24, C26 | 7 | 603 | CP0221 | PANASONIC | ECJ1VB0J105K | 1UF | ? | 1UF_X7R_6V3_15%_0603 | CAS-300106R |
| CAPACITOR_SINGLE-CP0255,220NF,16V,5%,5%,0603,0603B224J160NT | C1 | 1 | 603 | CP0255 | HITANO | 0603B224J160NT | 220NF | ? | 220NF_16V_5%_0603 | CAS-402236R |
| CAPACITOR_SINGLE-CP0259,33PF,50V,1%,1%,0603,CL10C330FB8NNNC | C48,C51 | 2 | 603 | CP0259 | SAMSUNG | CL10C330FB8NNNC | 33PF | ? | 33PF_NPO_50V_1%_0603 | CAP-903316R |
| CAPACITOR_SINGLE-XXXX,10UF,10V,10%,10%,1210,GRM32AR61C106KAB7L | C52 | 1 | 1210 | XXXX | MURATA | GRM32AR61C106KAB7L | 10UF | ? | 10UF_X5R_10V_10%_1210 LOW ESR | CAM-301005R |
| F4107R_SMT5X7-OS0040R,SMT5X7,VF3AH1-25MHZ | U5 | 1 | SMT5X7 | OS0040R | VALPEY_FISHER | VF3AH1-25MHZ | ? | IGNORE | 3.3V TIGHT STABILITY HCMOS SMD OSCILLATOR WITH STANDBY, 25MHz, 25ppm -40+85 (INDUSTRIAL) | OSC-507025R |
| FIDUSHEL | F1-F3 | 3 | FIDUSHEL | ? | ? | ? | ? | ? | ? | ? |

Table 3. Bill of Materials (continued)

| Part Name | Ref Des | Qty | JEDEC Type | Part No. | Vendor | Vendor Part No. | Value | BOM Ignore | Description | New Part No. |
|--|------------------------------------|-----|------------|----------|-----------|-------------------|-------|------------|--|--------------|
| HC49SM_I-25M-INDUSTRIAL_OX0040R | XTAL1 | 1 | HC49SM_I | OX0040R | HEC | HH2500-18-E-25PPM | ? | ? | XTAL HC49SM 25MHZ 100PPM 18PF INDUSTRIAL | CRS-250018R |
| HX1188NL_SM16-TF0116R,SM16, | T1 | 1 | SM16 | TF0122R | PULSE | HX1188NL | ? | ? | 10/100 BASE-T MAGNETICS | CON-118800R |
| JUMPER_TH-PN0019,JMP02,90120-0762 | J2,J5-J8,J10,J14 | 7 | JMP02 | PN0019 | MOLEX | 90120-0762 | ? | ? | MOLEX JUMPER 0.1 INCH | CON-901202R |
| JUMPER_TH-PN0019,JMP02,90120-0762 | J15 | 1 | JMP02 | PN0019 | MOLEX | 90120-0762 | ? | IGNORE | MOLEX JUMPER 0.1 INCH | CON-901202R |
| LED_SM-LD0021,50V,RC0805D,17_21SYGC_S530,GREEN | LD1-LD8 | 8 | RC0805D | LD0021 | EVERLIGHT | 17_21SYGC_S530 | ? | ? | GREEN_LED_SMD_0805 | LED-215301R |
| MII-PN0212,_AMP174218-2 | P1 | 1 | MII-MALE | PN0212 | AMP | AMP174218-2 | ? | ? | MII_40PIN_SHILDED_THRA_MALE | CON-174218R |
| NPN_IC-MMBT222AA-TR0001R | Q1 | 1 | SOT23 | TR0001R | XXXX | NPN-SM-MMBT222A | ? | ? | NPN SOT23 TRANSISTOR | TRS-104023R |
| PCAP_SINGLE-CT0024,100UF,10V,20%,20%,7343,EEJL1AD107R | C2,C3,C32 | 3 | 7343 | CT0024 | PANASONIC | EEJL1AD107R | 100UF | ? | 100UF_10V_20%_Tantalum_Low_ES R_D_Size | CAP-100343R |
| PCAP_SINGLE-CT0026R,47UF,20V,10%,10%,7343,TCSVS1D476KDAR | C27,C28 | 2 | 7343 | CT0026R | SAMSUNG | TCSVS1D476KDAR | 47UF | ? | 47UF_TANT_20V_10%_7343 | CAP-047343R |
| RESISTOR_2PIN-RE0004,0,0.06W,5%,RC0603JW_000E | R1,R32,R55,R59,R67,R73 | 6 | 603 | RE0004 | BOURNS | RC0603JW_000E | 0 | IGNORE | 0_0W06_5%_0603 | RES-100006R |
| RESISTOR_2PIN-RE0004,0,0.06W,5%,RC0603JW_000E | R2,R13,R14,R33,R56,R57,R66,R71,R72 | 9 | 603 | RE0004 | BOURNS | RC0603JW_000E | 0 | ? | 0_0W06_5%_0603 | RES-100006R |
| RESISTOR_2PIN-RE0005,0,0.1W,5%,RC0805JW_000E | R64,R65,R79,R106 | 4 | 805 | RE0005 | BOURNS | RC0805JW_000E | 0 | ? | 0R_0W1_5%_0805 | RES-100008R |
| RESISTOR_2PIN-RE0005,0,0.1W,5%,RC0805JW_000E | R77,R80 | 2 | 805 | RE0005 | BOURNS | RC0805JW_000E | 0 | IGNORE | 0R_0W1_5%_0805 | RES-100008R |
| RESISTOR_2PIN-RE0044,4.7K,0.06W,5%,CR0603JW-472E | R68 | 1 | 603 | RE0044 | BOURNS | CR0603JW-472E | 4.7K | ? | 4K7_0W06_5%_0603 | RES-404706R |
| RESISTOR_2PIN-RE0085,49.9,0.06W,1%,RC0402FR-0749R9 | R9-R12 | 4 | 402 | RE0085 | YAGEO | RC0402FR-0749R9 | 49.9 | ? | 49R9_0W06_1%_0402 | RES-249914R |
| RESISTOR_2PIN-RE0114R,4.99K,0.06W,1%,CR0603-FX-4991ELF | R60 | 1 | RC0603 | RE0114R | BOURNS | CR0603-FX-4991ELF | 4.99K | ? | RESISTOR_4.99K_1%_0603 | RES-349906R |
| RESISTOR_2PIN-RE0125,1K,0.06W,1%,CR0603FX_1001E | R62 | 1 | 603 | RE0125 | YAGEO | CR0603FX_1001E | 1K | ? | 1K_0W06_1%_0603 | RES-300106R |
| RESISTOR_2PIN-RE0152,470,0.1W,1%,CR0603FX-470R | R42,R45,R46,R49,R50,R54 | 6 | 603 | RE0152 | YAGEO | CR0603FX-470R | 470 | ? | 470_0W1_1%_0603 | RES-147006R |
| RESISTOR_2PIN-RE0182,10K,0.06W,1%,RC0603FR_0710K | R58 | 1 | 603 | RE0182 | YAGEO | RC0603FR_0710K | 10K | ? | 10K_0W06_1%_0603 | RES-301006R |
| RESISTOR_2PIN-RE0218,200,0.06W,1%,RC0603FR-07200R | R63 | 1 | 603 | RE0218 | AVX | RC0603FR-07200R | 200 | ? | 200R_0W06_1%_0603 | RES-320006R |
| RESISTOR_2PIN-RE0294,75,0.06W,1%,CR0603FX_75R | R5-R8 | 4 | 603 | RE0294 | YAGEO | CR0605FX_75R | 75 | ? | 75R_0W06_1%_0603 | RES-107506R |
| RESISTOR_2PIN-RE0343,3.3K,0.06W,1%,CR0402FX-3301G | R3 | 1 | 402 | RE0343 | YAGEO | CR0402FX-3301G | 3.3K | ? | 3K3_0W06_1%_0402 | RES-403304R |
| RESISTOR_2PIN-RE0475,5.62K,0.06W,1%,RC0603FR-075K62 | R61 | 1 | 603 | RE0475 | YAGEO | RC0603FR-075K62 | 5.62K | ? | 5K62_0W06_1%_0603 | RES-856216R |
| RESISTOR_2PIN-RE0518R,402,0.06W,1%,CR0603-FX-402RELF | R4 | 1 | 603 | RE0518R | BOURNS | CR0603-FX-402RELF | 402 | ? | RESISTOR_402OHM_1%_0603 | RES-140206R |
| RESISTOR_2PIN-RE0536R,1M,0.06W,1%,RC0402FR-071M | R70 | 1 | RC0402 | RE0536R | YAGEO | RC0402FR-071M | 1M | ? | RESISTOR_1M_1%_0402 | RES-600104R |

Table 3. Bill of Materials (continued)

| Part Name | Ref Des | Qty | JEDEC Type | Part No. | Vendor | Vendor Part No. | Value | BOM Ignore | Description | New Part No. |
|---|---|-----|-----------------------|----------|--------|-----------------------|-------|------------|--|--------------|
| RESISTOR_2PIN-RE0661R,2.2K,0.06W,1%,CR0402FR-072K2L | R35-R39, R43,R44, R47, R48, R52, R53, R74, R75, R82, R97, R99 | 16 | 402 | RE0661R | YAGEO | CR0402FR-072K2L | 2.2K | ? | 2.2K_0W06_1%_0402 | RES-402204R |
| RESISTOR_2PIN-RE0661R,2.2K,0.06W,1%,CR0402FR-072K2L | R40, R41, R51, R76, R78, R83-R92, R98 | 16 | 402 | RE0661R | YAGEO | CR0402FR-072K2L | 2.2K | IGNORE | 2.2K_0W06_1%_0402 | RES-402204R |
| RESISTOR_2PIN-RE0662R,33,0.06W,1%,CR0402FR-0733R | R15-R31 | 17 | 402 | RE0662R | YAGEO | CR0402FR-0733R | 33 | ? | 33_0W06_1%_0402 | RES-103304R |
| RESISTOR_2PIN-XXXX,4.87K,0.06W,1%,CR0603-FX-4871ELF | R96 | 1 | RC0603 | XXXX | BOURNS | CR0603-FX-4871ELF | 4.87K | ? | RESISTOR_4.87K_1%_0603 | RES-404876R |
| TLK110_REV4_IC-XXXX. | U6 | 1 | QFP50P900X900 X120-49 | XXXX | TI | TLK110 | ? | ? | INDUSTRIAL ETHERNET 10/100BT | CON-110000R |
| TP30MIL_MECHANICAL-MC0002R | TP30MIL1, TP30MIL19-TP30MIL22 | 5 | TH | MC0002R | SAMTEC | HMTSW-101-07-TM-S-240 | ? | ? | TESTPOINT_TH_0.9mm_pad_1.7MM | CON-101240R |
| TP30MIL_MECHANICAL-MC0002R | TP30MIL2-TP30MIL18 | 17 | TH | MC0002R | SAMTEC | HMTSW-101-07-TM-S-240 | ? | IGNORE | TESTPOINT_TH_0.9mm_pad_1.7MM | CON-101240R |
| TPM_MECH_VIA | M200-M203 | 4 | TPM_MECH_VIA | ? | ? | ? | ? | ? | ? | ? |
| TPS3825-33DBVT_IC-MX0052,DBV,TPS3825-33DBVT | U3 | 1 | DBV | MX0052 | TI | TPS3825-33DBVT | ? | IGNORE | PROCESSOR SUPERVISORY CIRCUITS WITH MR_N INPUT | REG-382533R |
| TPS74801DRC_IC-VR0096R,SON10,TPS74801DRC | U4 | 1 | SON10 | VR0096R | TI | TPS74801DRC | ? | ? | LDO 1.5A ADJ | REG-748010R |
| TPS75433Q_IC-VR0095R,TSSOP-20,TPS75433Q | U1 | 1 | TSSOP-20 | VR0095R | TI | TPS75433Q | ? | ? | LDO 3.3V 2A | REG-754330R |

4 Software

The EVM does not require any specific software and can be controlled with networking equipment that support a MII interface. However for SmartBits users, TI can provide a proprietary GUI that simplifies the controllability of the TLK110CUSEVM through SmartBits and allows advanced features such as a cable diagnostic tool.

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EVM Warnings and Restrictions

It is important to operate this EVM within the input voltage range of 5 V or 3.3 V and the output voltage range of N/A V to N/A V .

Exceeding the specified input range may cause unexpected operation and/or irreversible damage to the EVM. If there are questions concerning the input range, please contact a TI field representative prior to connecting the input power.

Applying loads outside of the specified output range may result in unintended operation and/or possible permanent damage to the EVM. Please consult the EVM User's Guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative.

During normal operation, some circuit components may have case temperatures greater than 60° C. The EVM is designed to operate properly with certain components above 60° C as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

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As noted in the EVM User's Guide and/or EVM itself, this EVM and/or accompanying hardware may or may not be subject to the Federal Communications Commission (FCC) and Industry Canada (IC) rules.

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General Statement for EVMs including a radio

User Power/Frequency Use Obligations: This radio is intended for development/professional use only in legally allocated frequency and power limits. Any use of radio frequencies and/or power availability of this EVM and its development application(s) must comply with local laws governing radio spectrum allocation and power limits for this evaluation module. It is the user's sole responsibility to only operate this radio in legally acceptable frequency space and within legally mandated power limitations. Any exceptions to this are strictly prohibited and unauthorized by Texas Instruments unless user has obtained appropriate experimental/development licenses from local regulatory authorities, which is responsibility of user including its acceptable authorization.

For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant

Caution

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Interference Statement for Class A EVM devices

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

For EVMs annotated as IC – INDUSTRY CANADA Compliant

This Class A or B digital apparatus complies with Canadian ICES-003.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Concerning EVMs including radio transmitters

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concerning EVMs including detachable antennas

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Cet appareil numérique de la classe A ou B est conforme à la norme NMB-003 du Canada.

Les changements ou les modifications pas expressément approuvés par la partie responsable de la conformité ont pu vider l'autorité de l'utilisateur pour actionner l'équipement.

Concernant les EVMs avec appareils radio

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

【Important Notice for Users of this Product in Japan】

This development kit is NOT certified as Confirming to Technical Regulations of Radio Law of Japan

If you use this product in Japan, you are required by Radio Law of Japan to follow the instructions below with respect to this product:

1. Use this product in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use this product only after you obtained the license of Test Radio Station as provided in Radio Law of Japan with respect to this product, or
3. Use of this product only after you obtained the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to this product. Also, please do not transfer this product, unless you give the same notice above to the transferee. Please note that if you could not follow the instructions above, you will be subject to penalties of Radio Law of Japan.

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3. You will employ reasonable safeguards to ensure that your use of the EVM will not result in any property damage, injury or death, even if the EVM should fail to perform as described or expected.
4. You will take care of proper disposal and recycling of the EVM's electronic components and packing materials.

Certain Instructions. It is important to operate this EVM within TI's recommended specifications and environmental considerations per the user guidelines. Exceeding the specified EVM ratings (including but not limited to input and output voltage, current, power, and environmental ranges) may cause property damage, personal injury or death. If there are questions concerning these ratings please contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM User's Guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative. During normal operation, some circuit components may have case temperatures greater than 60°C as long as the input and output are maintained at a normal ambient operating temperature. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors which can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during normal operation, please be aware that these devices may be very warm to the touch. As with all electronic evaluation tools, only qualified personnel knowledgeable in electronic measurement and diagnostics normally found in development environments should use these EVMs.

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