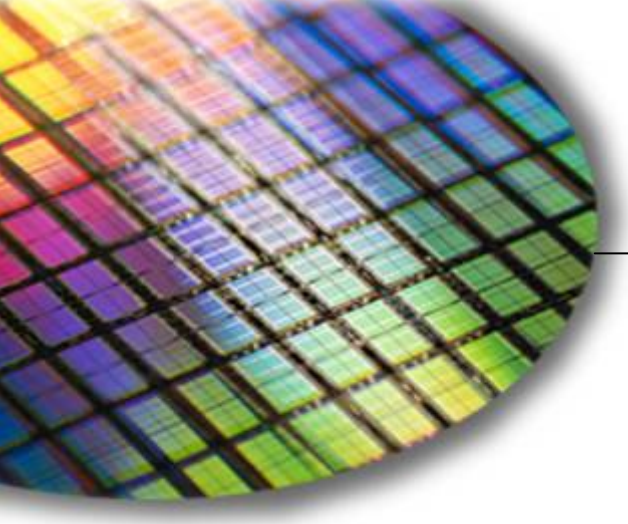


iCoupler®

The World Leader in High Performance Signal Processing Solutions

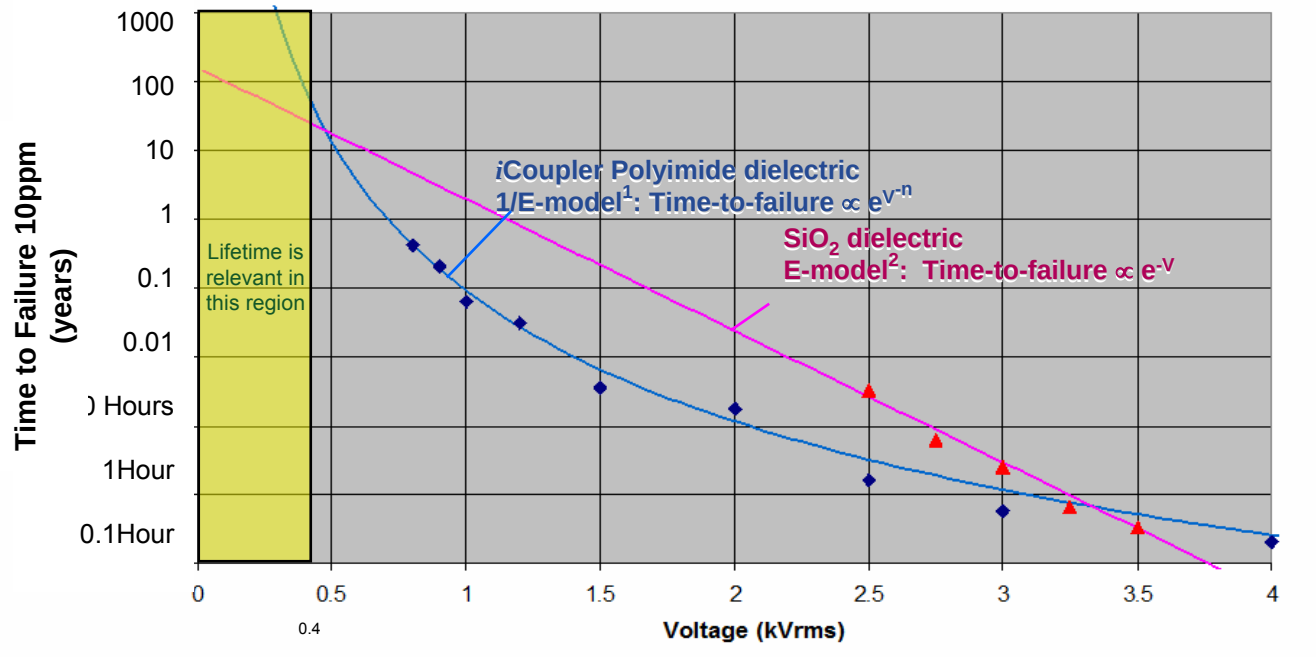
The Real Facts about *i*Coupler® Product Quality and Reliability

From the Pioneers of *i*Coupler® Technology

May 2009

ANALOG DEVICES

*i*Coupler Lifetime > 50yrs (400Vrms)

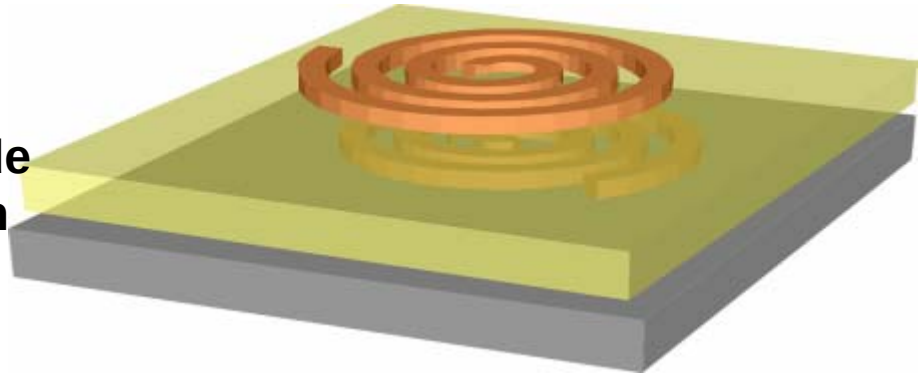


- **Lifetime at Working Voltage Determined By:**
  - High Voltage Testing to Determine Acceleration Factor
  - Acceleration Factor Used to Predict Lifetimes at Working Voltages
  - Competitive solutions use SiO_2
- **Polyimide and SiO_2 have different break down mechanisms with different lifetime characteristic curves**

1) McPherson, et al, “Comparison of E and 1/E TDDB Models for SiO_2 Under Long-term/Low-field Test Conditions”, 98 IEDM, pp. 731-734.
2) Fowler and Nordheim, "Electron Emission in Intense Electric Fields", Proc.Roy.Soc. (London) A119, pp. 173-181, 1928

*i*Coupler Polyimide Dielectric Proven Superior

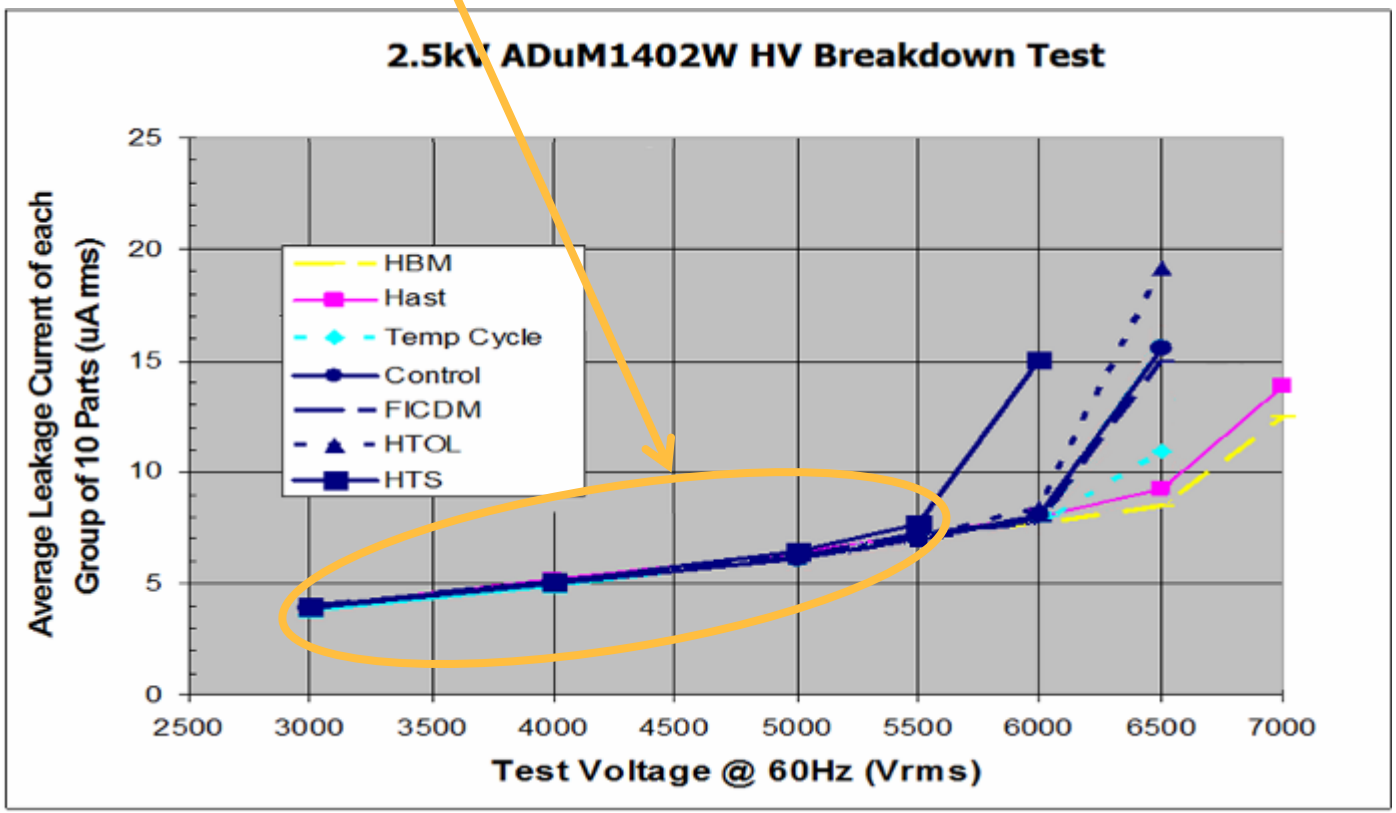
20 µ m polyimide
> 5kV isolation



- **3.75kVrms and 5kVrms insulation options.**
- **Reinforced isolation certification.**
- **Polyimide robust over temperature**
- ***i*Coupler products pass all relevant environmental stress tests**
- **>250 million *i*Coupler channels shipped with polyimide isolation with zero field failures**

*i*Coupler Polyimide Dielectric Retains Integrity

- **Polyimide Insulation passes Accelerated Life Stress Tests**
  - HTOL, HAST, HTS, Temp. Cycle, ESD
  - Leakage after Stress Unchanged within Isolation Rating up to 5kVrms

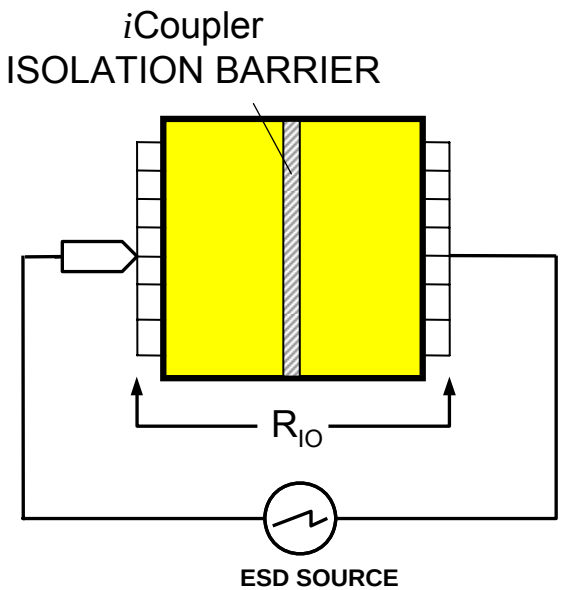


ANALOG DEVICES

*i*Coupler Isolation is Not Degraded by ESD

iCoupler Isolators Withstand 13.0 kV ESD Level per IEC 61000-4-2

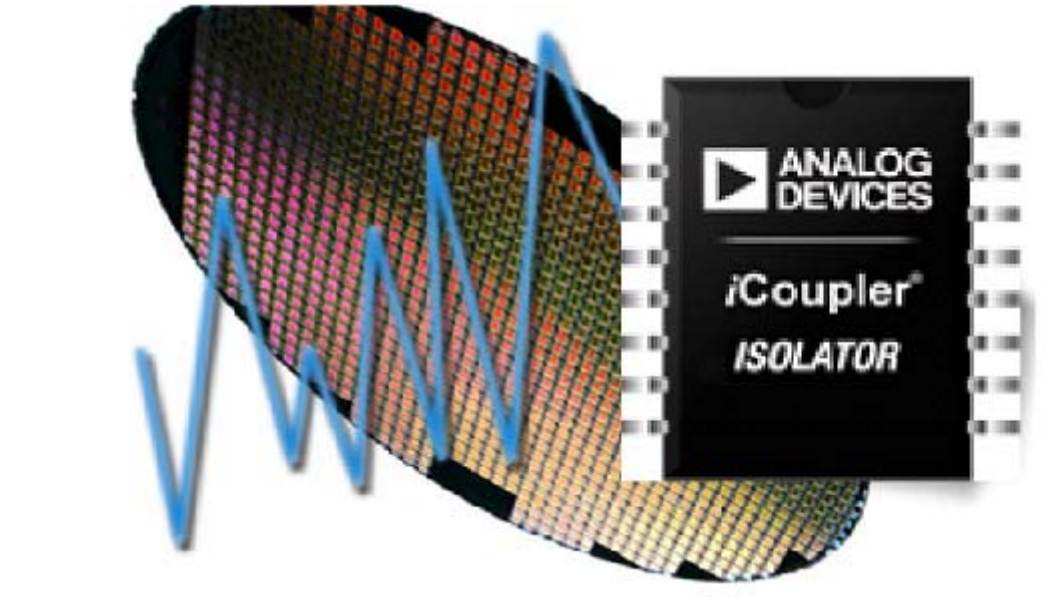
- Barrier Subjected to 5 Discharges at 13.0 kV
- Post-Discharge Resistance Measurement Verification



Unit	ESD Peak Voltage (kV)	Insulation Resistance R_{IO}
1	13	>2 GΩ
2	13	>2 GΩ
3	13	>2 GΩ
4	13	>2 GΩ
5	13	>2 GΩ

Note: Arcing across packages surfaces occurs at voltages greater than 13 kV

*i*Coupler Products Have High ESD Protection



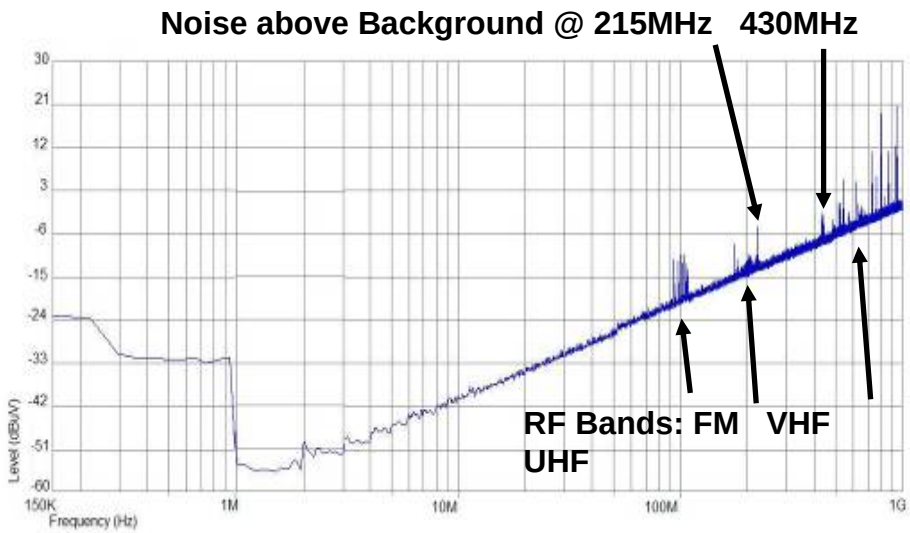
- **Standard *i*Couplers rated at 2kV ESD HBM, meets industry standards for CMOS devices.**
- ***i*Coupler products that drive lines directly, such as RS485 have offer 15kV ESD HBM**
  - ADM2482E, ADM2484E, ADM2487E, etc…

ANALOG DEVICES

*i*Coupler EMI Radiation Below Background

- **Transformers do <u>not</u> generate high emissions**
  - Low-level EMI above background at 215 MHz (7 dB µV) and 430 MHz (5 dB µV)
  - Likely due to dispersion on power plane at harmonics of 1 ns data transmission pulses
  - In Practice, most issues are related to PCB design, not transformers
  - ***i*Coupler isolators meet FCC Class A and Class B limits with proper bypassing**

ADuM1201 Emissions Measured @ 1Mbps Input per SAE J1752-3 as Measured via TEM Cell



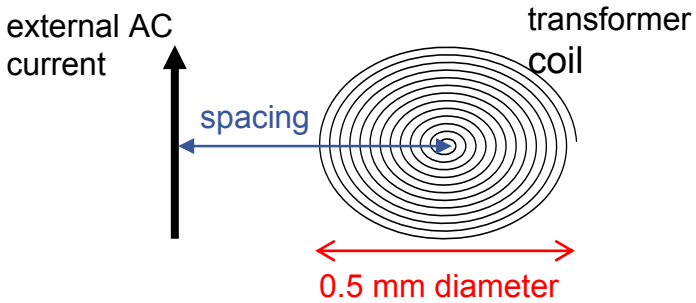
*i*Coupler E-field Immunity Test Report

ADuM120x

Name of Test	Basic Standard	Test Specification	Results
Radiated Electro – magnetic field	IEC6100-4-3: 1995	80MHz to 1000MHz 80% AM @ 1kHz Level X 100V/m	Complies
Radiated Electro-magnetic Field RS103	MIL-STD 461E RS103	2MHz to 30MHz 50% AM @1kHz 200V/m	Complies
Radiated Electro-magnetic Field RS103	MIL-STD 461E RS103	30MHz to 1000MHz 50% AM @ 1kHz 100V/m	Complies
Radiated Electro – magnetic field	AEC-Q100	150kHz to 1GHz 80% AM @ 1kHz 300V/m	Complies

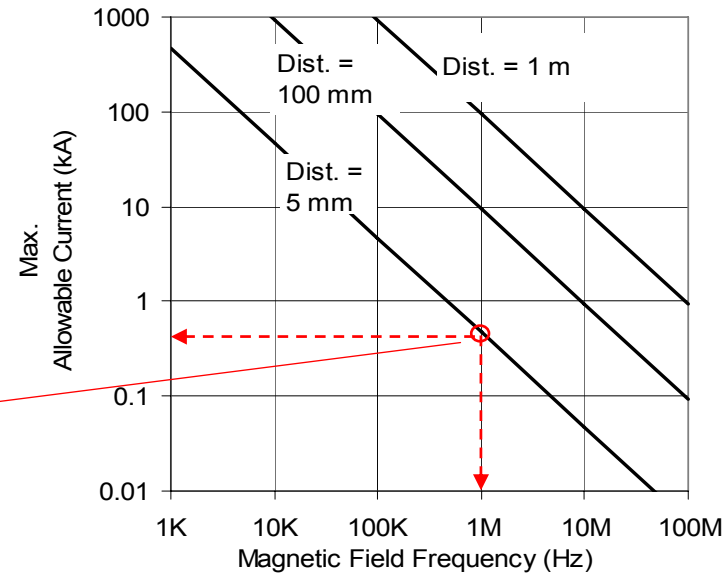
*i*Coupler Products are Extremely Immune to External Magnetic Fields

- **iCoupler Isolators Are Immune to External Magnetic Fields**
  - The conditions required to disrupt performance exceed that encountered in all *i*Coupler applications
- **No Magnetic core to concentrate external magnetic fields**



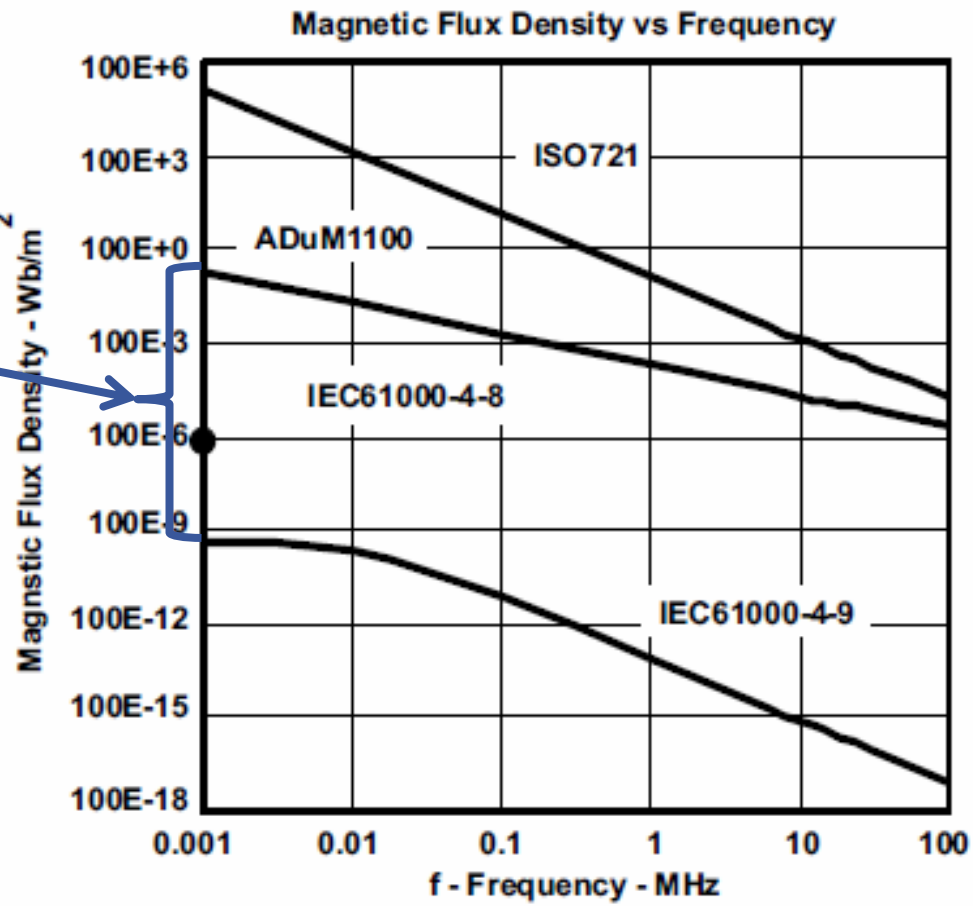
This chart quantifying the conditions at which performance is disrupted is included in all iCoupler data sheets.

Example:
If a 1 MHz current were placed 5 mm away from an iCoupler isolator, it would have to have a magnitude of 500 A before the iCoupler isolator is affected!

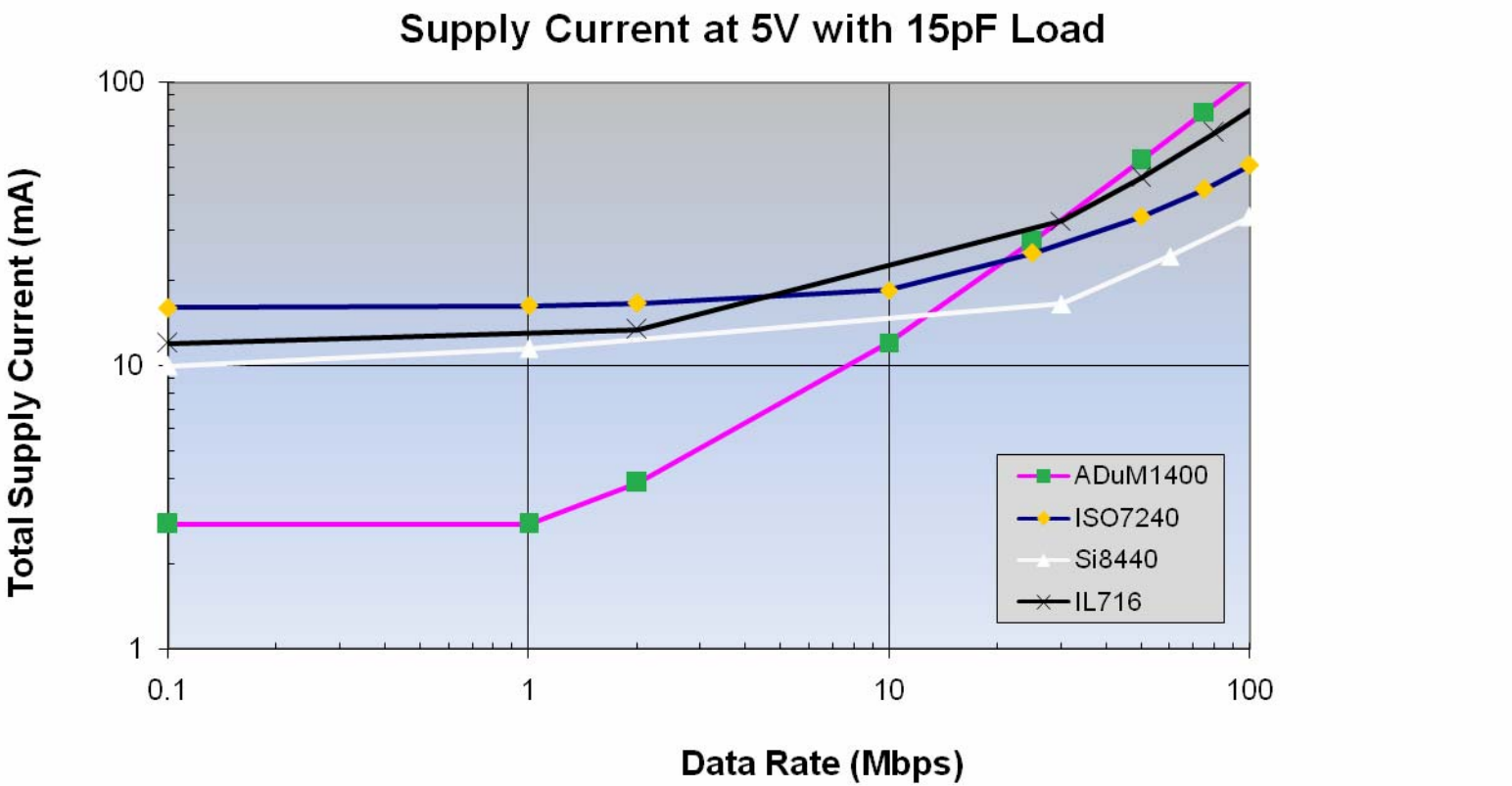


*i*Coupler Transformers Have 10^9 More Immunity Than Needed

- ***i*Coupler transformers have 10^9 times more magnetic immunity than needed**
- ***i*Couplers have air core transformers**
  - No high magnetic permeability materials to concentrate magnetic fields into coils.



*i*Coupler Products have Low Power Consumption



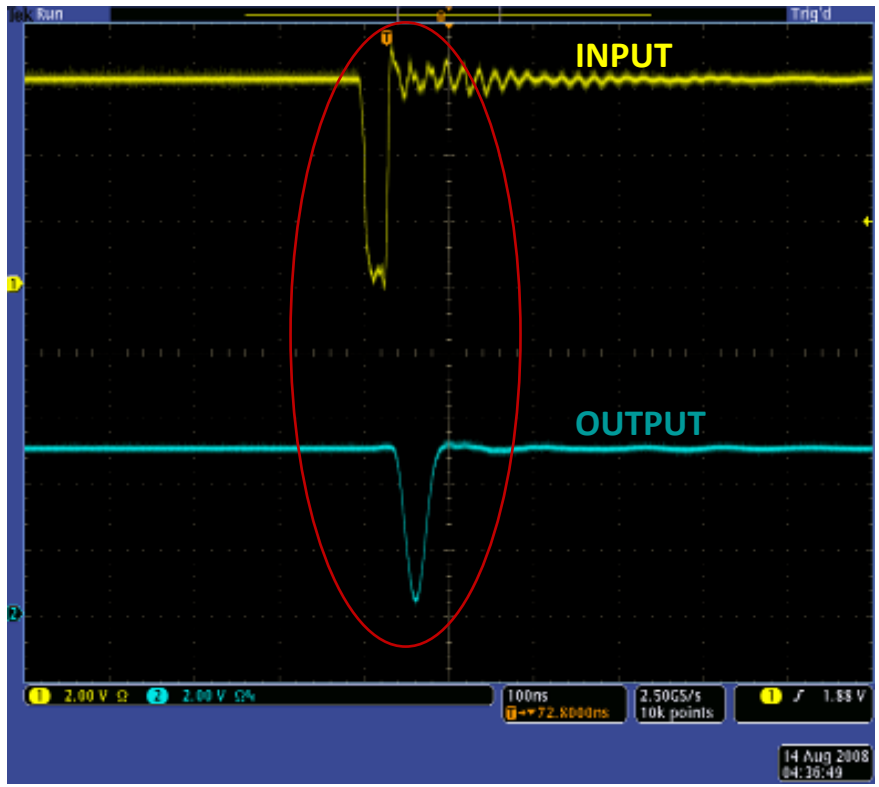
- ***i*Coupler isolators consume less power at typical application data rates, up to 12Mbps**

*i*Coupler Isolators Behave Better Outside Specified Limits For Short Width Pulses

ADuM1410A supports short width pulses

- *i*Coupler interprets a 30ns input pulse correctly

- **Some competitive solutions do not follow short width pulses**



*i*Coupler Summary

- **High performance : high speed, high precision, low power, high accuracy and high temperature grade isolators.**
- **Long lifetime : > 50 years at 400Vrms**
- **Polyimide dielectric retains integrity after stress tests.**
- **Magnetic Immunity is 10^9 more than required.**
- **High EMC immunity; EMI emissions below background.**
- **ESD ratings meet industry standard.**