
SUBVERSIVE MANUFACTURERS

COULD RUIN

YOUR BUSINESS

**OPERATORS FACE FINES AND SHUTDOWNS
DUE TO FCC CHEAT**



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RECENTLY, A FRIED CHICKEN RESTAURANT FRANCHISE IN TEXAS RECEIVED A CEASE AND DESIST ORDER FROM THE FEDERAL COMMUNICATIONS COMMISSION (FCC) FOR OPERATING AN UNLICENSED RADIO STATION THAT INTERFERED WITH IMPORTANT COMMUNICATIONS IN THE AREA, INCLUDING RADIO TRANSMISSIONS AT A NEARBY AIRPORT.

To comply with the order, the restaurant was forced to turn off outdoor LED signs at two locations in the city.

A chicken restaurant operating an unlicensed radio station? You read that right. The digital signs, imported from Asia and distributed by American assemblers, were emitting so much radio interference that the FCC deemed them “unlicensed radio stations” and cited them for threatening the safety of airport communications more than four miles away.

Suddenly, a tool that was intended to be an investment in this business was reduced to an unusable black box. Through no fault of their own, the business lost potential revenue while the signs were dark, and ultimately had to pay to replace them with new signs – this time designed and manufactured in America.

This scenario is playing out all over the United States and with greater frequency. Digital billboards and LED signs are even being blamed for wreaking havoc with uplink signals to nearby cell towers, according to a recent AT&T filing with the FCC. There have been additional cases involving billboards in Tennessee, Oklahoma and New Jersey.

WHY ARE COMPLAINTS INCREASING?

One reason is that there are simply more wireless frequencies in use. In addition to the proliferation of devices, 4G networks use less power than previous cellular bands. As a result, receiving equipment like cell phones are more sensitive than ever, and increased reliance on wireless technology means dropped calls and slow data speeds are more frequently reported. Cellular companies are becoming very aggressive in rooting out and enforcing encroachment within the bands they own.

But the most troubling reason for the rise in interference is the increased use of non-compliant, Asian-manufactured LED sign products, which today number in the tens of thousands throughout the country.

According to AT&T’s FCC filing:

“SOME MANUFACTURERS OF DEVICES USING LEDS AND BALLASTS ARE LESS MOTIVATED TO REDUCE NOISE BECAUSE OF THE ADDED COST. INSTEAD, THEY TAKE SHORTCUTS IN DESIGN AND CONSTRUCTION TO KEEP PRICES LOW, WHICH IN TURN MAKES THOSE DEVICES LESS EXPENSIVE AND UNFORTUNATELY MORE ATTRACTIVE TO THE AVERAGE CONSUMER.”

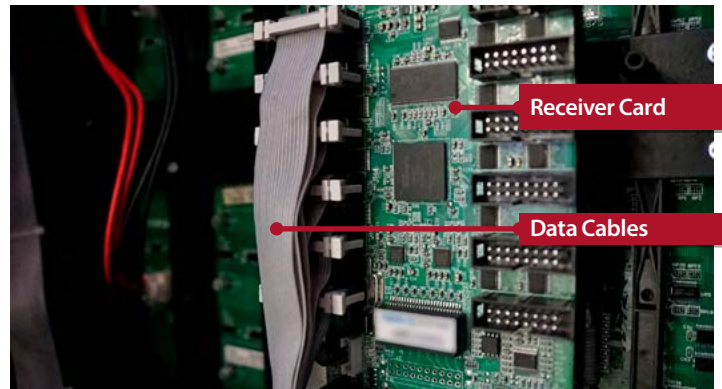
FATAL DESIGN FLAWS IN IMPORTS RESULT IN REMOVAL AND FINES.

Most Asian-manufactured LED signs and digital billboards have a common design flaw that cannot be remedied. This cookie-cutter design, used by both prominent and low-end Asian providers, features an architecture that grossly exceeds emissions limits, and this is where the problem begins.

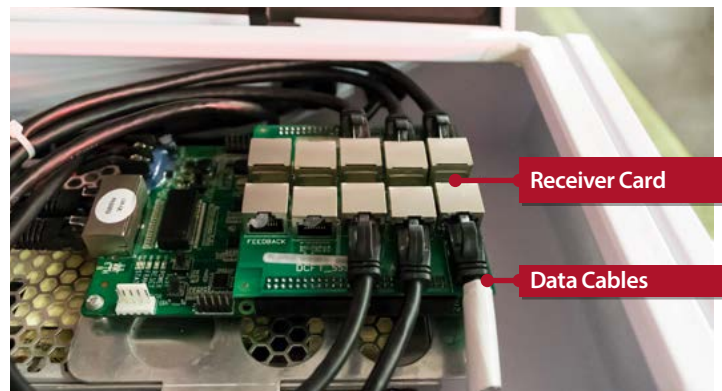
The common import sign architecture uses an intermediate controller unit called a receiver card which sits between the controller and the sign's LED panels or modules. The modules are passive, relying on data delivered from the receiver card over multi-conductor cables to display an image.

In order to generate an animation or image on the sign, the transmission of this data must operate at very high speeds, upwards of 30 MHz. Digital signals make multiples of themselves, which creates what are known as harmonics, or potentially harmful emissions at multiple frequencies.

The receiver card distributes data signals to the modules via a host of cables and connections, often but not always via ribbon cables containing dozens of wires. This results in a field of antennas that radiate massive emissions. Even if the cables are not ribbons and even if they are shielded, they still emit far too much electromagnetic noise to pass FCC guidelines.



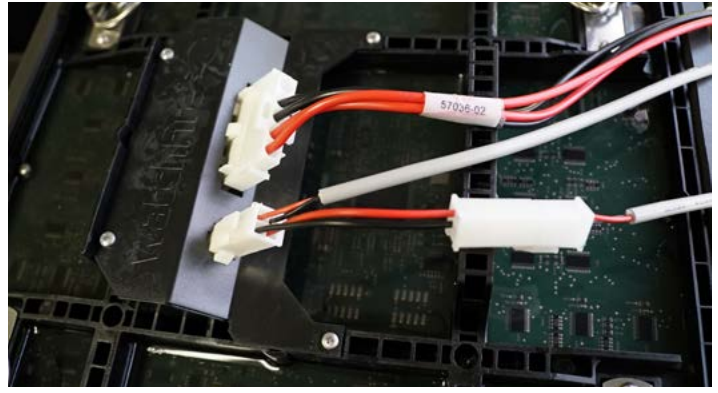
EXAMPLE OF ASIAN IMPORT ARCHITECTURE: Ribbon cables carry data signals from the receiver card to the LED modules.



EXAMPLE OF ASIAN IMPORT ARCHITECTURE: Ethernet/RJ45 connections from the receiver card also create harmful emissions.

Digital signs designed and manufactured by vertically-integrated American manufacturers have a simpler, streamlined design to minimize emissions. For example, Watchfire confines high speed data signals to individual smart LED modules, each with its own microcontroller that runs the LEDs. This allows data to reside on the modules themselves and not be passed at the massive levels required in alternative architectures. The LED drivers we use employ pulse width modulation (pwm) which reduces data signals and lowers emissions.

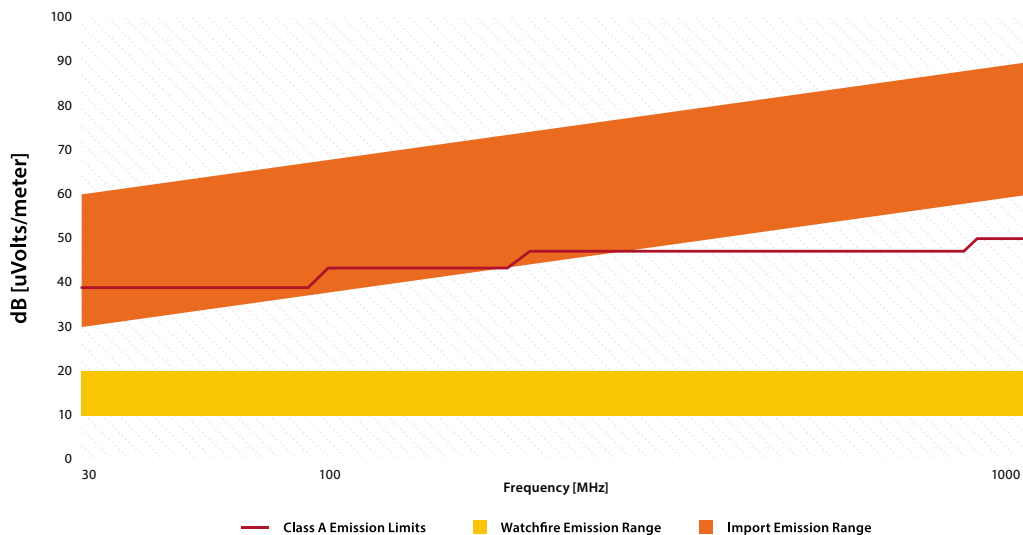
The difference in design between true American manufacturer digital signs and imports can be illustrated by the amount of data needed to run the modules. Watchfire's signs send about 8,000 bits of information to each module to produce one image; the imports must send about 900,000 bits of data to produce the same image. That's over 112 times more data per module. Remember that more data signals create more harmonics, and more harmonics create more interference.



THE WATCHFIRE WAY: Data signals travel directly from the controller to the module. Electromagnetic emissions are kept within limits and 100% of Watchfire signs are FCC verified.

The pathways that the data takes also present a stark contrast between American and Asian manufactured signs. Instead of using ribbon cables or other low quality connections like those found in an old desktop computer, Watchfire uses a single twisted pair RS485 connection using differential signaling. This design minimizes cabling, reduces connections and lowers emissions.

Unfortunately, it doesn't appear that the design flaw present in most Asian signs can be fixed without a complete redesign. Watchfire has analyzed multiple imported signs and has determined that field fixes like additional shielding and modification of data signal speeds is not enough to bring the signs into compliance. In fact, tests by an independent lab showed that a sign with this common Asian-manufactured architecture exceeded FCC guidelines by 100 times the allowed limit.



Subversive Manufacturers Could Ruin Your Business

ARE THE RULES BEING DISREGARDED?

How can digital signs be sold in the United States if they don't pass FCC emissions guidelines? In order to understand this, let's take a look at the FCC requirements and testing procedure as it relates to digital signs.

The specific section of FCC code that governs digital signs resides in Part 15 of Title 47. Part 15 covers electronic equipment that generates RF emissions that are intentional, unintentional or incidental.

Any company that designs, manufactures or markets a digital device in the U.S. must comply with FCC emissions testing per Part 15. The FCC requires that electronic equipment, such as digital signs, be tested to ensure compliance with emissions limits and to show that the equipment won't cause harmful electromagnetic interference to other devices. But for products like digital signs, the FCC does not actually perform the testing.

Instead, an honor-system of sorts requires that the manufacturer receive verification of the final product from an accredited third-party testing lab. The FCC does not even require that the manufacturer submit the test results, and to date there is no database or registry to document which products have been tested.

ONCE VERIFIED, PART 15 REQUIRES THAT A STICKER, SOMETIMES CALLED A TWO-PART WARNING, WITH THE FOLLOWING STATEMENT BE AFFIXED TO THE EXTERIOR OF THE PRODUCT:

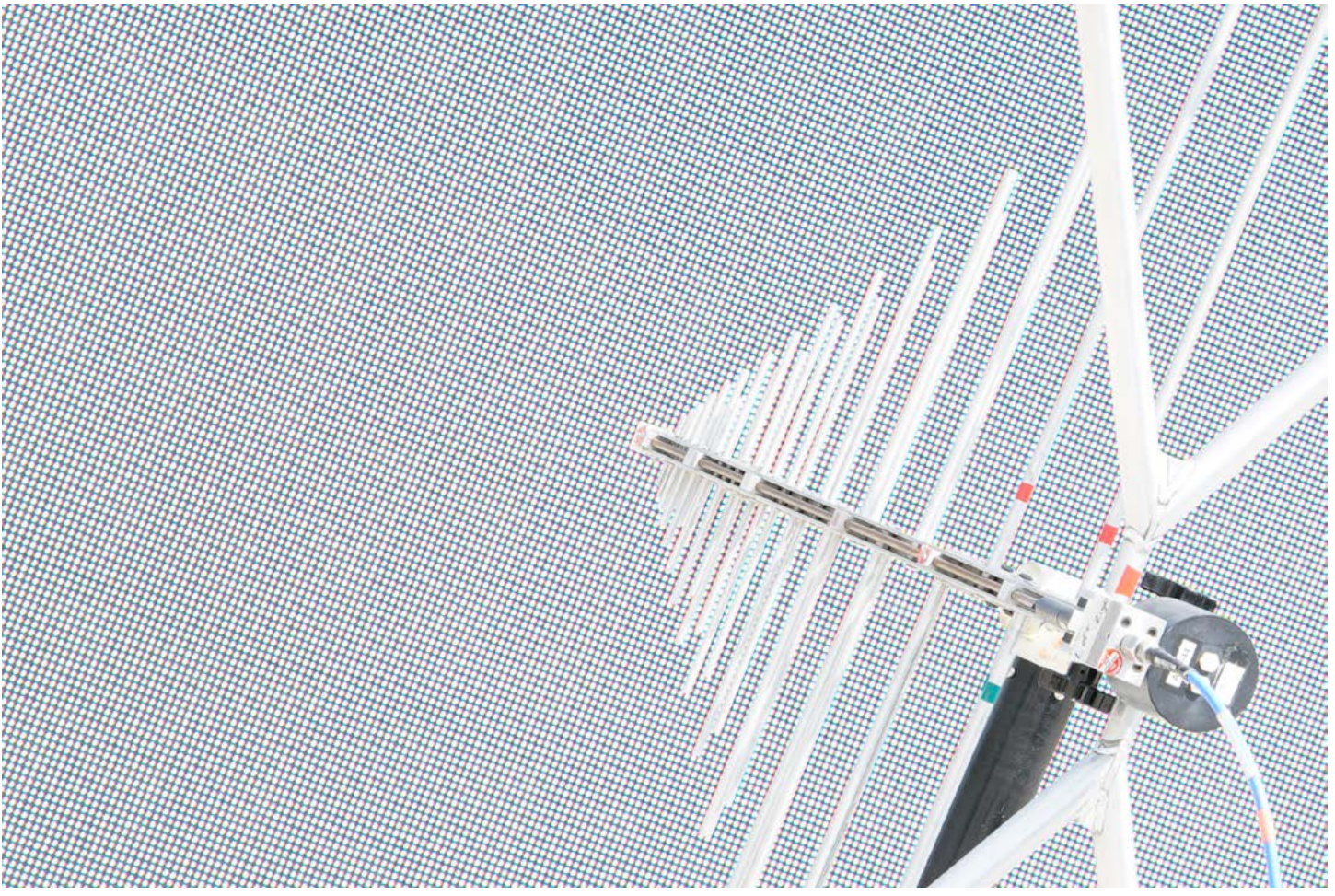
"This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation."

Despite these regulations, many importers either don't have their digital signs tested, or the signs fail and the manufacturers continue to sell their products in the United States to unsuspecting buyers. Some Asian-made signs we inspected did not display the required two-part warning sticker, and none passed emissions testing when sent to a third-party lab.

Even more concerning is evidence that some importers appear to be using a subversive "test mode" that temporarily and artificially reduces emissions during testing. Similar to the Volkswagen diesel emissions scandal, a test mode is a cheat that would allow the sign to pass at the lab, but would not be enabled as part of operation in the field. We discovered a scheme whereby the importer tests the signs and controller separately, broadcasting an image on the sign before removing or disabling the controller for testing. They have reports and certifications for each piece of the sign, but when operated together as they would in the field, they do not meet the FCC's standards.

The practice of eliminating data transfer from the controller during the test is in direct defiance of the FCC's provision that equipment be tested in such a manner as to maximize the level of emissions. This "cheat" is the sign industry's version of the "VW scandal" that broke in 2015 and has resulted in more than \$1 billion in fines.

In contrast, Watchfire's engineers deploy a variety of in-house tests aimed at confirming emissions compliance throughout the design process. Then, as prescribed by the law, each final design is tested by an accredited independent lab. It's an expensive process, and it takes skilled engineers and high quality components to develop a verified product. Every Watchfire product also bears the required two-part warning sticker. Testing, both in-house and in the lab, isn't cheap, but it is the law and it's the right thing to do.



THE WATCHFIRE WAY: Specialized equipment is used to test the emissions of a Watchfire billboard.

FCC “HONOR SYSTEM” PUTS RISK ON THE BUYER.

Since the FCC has implemented a self-directed testing program, the environment is ripe for importers to either skirt the system or cheat outright. Perhaps their disregard for the law stems from the perception that their violations will go undetected. Based on the increased incidence of interference reports, their perception is wrong, and some sign owners are discovering that the rules for compliance are strict.

With regard to harmful interference, like the type of RF emissions the restaurant in Texas was cited for, Part 15 places the responsibility of operation and the remediation of interference on the end user.

You might want to read that again. The manufacturer skirts the rules, but the buyer is the responsible party in the event of an interference claim.

Unfortunately, business owners who are buying these products often don't know enough to verify that a product is compliant with the FCC's rules. They trust in the system, the manufacturer and the sign company.

Without proper education, that trust is misplaced. All too often the first indication that they have purchased a digital sign that hasn't passed emissions standards is a cease and desist letter either from the FCC or from one of the cellular companies.

Sign owners and billboard operators are then forced to shut off the sign and pay a hefty fine. Either way, they are out tens of thousands of dollars. Since many of these digital signs are owned by small businesses, the impact is particularly devastating. Not only is their large investment in a digital sign worthless, but their main advertising vehicle is also taken away.

Once the FCC is involved, the manufacturers that sell equipment without the appropriate verification can also be fined, but that's little comfort to a business owner trying to keep the doors open. And to the manufacturer, it's barely a gamble in their "here today gone tomorrow" operations.

In addition to the disastrous repercussions a consumer might face, sign companies can be harmed as well, as they most likely will bear some of the cost to replace the offending sign. Certainly, their reputation will take a blow.

This contempt for the American rule of law can also have far reaching implications in the U.S economy. American manufacturers, who have a history of following the guidelines by creating better-designed products face unfair competition from foreign manufacturers who are cutting corners and ignoring federal law to offer cheaper products.

HOW TO AVOID BEING A VICTIM.

There are several steps that sign operators and dealers can take to ensure the digital signs they are buying or specifying meets FCC Part 15 emissions guidelines. Here are some questions to ask the sign manufacturer:

- 1. What specific rules govern your product, and how specifically have you complied with these rules?**
- 2. Do you fall under any exemptions as outlined in Title 47 Part 15.103?**
- 3. Can you provide the test reports that shows that this exact model meets the requirements of Title 47 Sections 2.955, 15.105, 15.107 and 15.109?**
- 4. Was the equipment tested under normal operating conditions and in a state such as to cause maximum emissions as prescribed by FCC Part 15?**
- 5. Can you provide a photo of the label that meets the requirements of Title 47 Part 15.19?**

As professionals in the sign industry, it is your responsibility to understand the laws of compliance that are set forth by the FCC. Whether importers of Asian sign products are ignorant of the law or are actively disobeying it, the practice has the potential to harm businesses, billboard operators and sign companies alike. Reputable manufacturers will be happy to provide the information and education needed to ensure their digital sign products meets all FCC standards, and will be a partner with you through the duration of your ownership.

