

# 3M™ Window Film

## Electromagnetic Interference (EMI)

### BACKGROUND AND DEFINITIONS

#### Basic Background Information

1. Why are we involved with EMI Shielding?
  - a. Customers have asked if our 3M™ Sun Control Window Films will block radio waves or microwaves
  - b. Some of our current competitors claim that their products work for this application
2. What is EMC, EMI and EMIC?
  - a. **EMC** - Electromagnetic Compatibility - Electrical devices have EMC when the electrical noise generated by each device does not interfere with the normal performance of the other device
  - b. **EMI** - Electromagnetic Interference - EMI is said to exist when undesirable voltage or currents adversely affect the performance of a device
  - c. **EMIC** - Electromagnetic Interference Control - The process of making design changes or adjustments of signal or noise levels is called EMIC
3. What is EMI and EMIC?
  - a. When electricity flows it generates electromagnetic waves
  - b. The wavelength and frequency of the wave determines where these waves are classified in the Electromagnetic Spectrum
  - c. EM waves can interfere with the performance of electronic devices
  - d. All electronic devices generate EMI.
  - e. Grounding or adding filters is an EMIC method.
4. Why is EMIC necessary?
  - a. Protect electronic equipment from destructive outside interference such as:
    1. High power transmitters (radar, FM, etc.)
    2. Nuclear effects - electromagnetic pulse (EMP)
    3. Lighting
  - b. Protect electronic equipment from temporary equipment malfunctions
5. How is the EMI shielding achieved?
  - a. EM waves (fields) are reduced (attenuated) through absorption or reflection by conductive surfaces (shields)
  - b. The most effective shields are metallic and electrically conductive
  - c. How well the shield attenuates the field is called its shielding effectiveness (SE)

#### Important:

The information provided in this report is believed to be reliable; however, due to the wide variety of intervening factors, 3M does not warrant that the results will necessarily be obtained. All details concerning product specifications and terms of sale are available from 3M.



Renewable Energy Division  
St. Paul, MN 55144-1000  
1-866-499-8857  
[www.3M.com/windowfilm](http://www.3M.com/windowfilm)

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## TEST RESULTS

### Shielding Effectiveness for 3M™ Films

Tested according to ASTM D 4935, "Standard Test Method for Measuring the Electromagnetic Shielding Effectiveness of Planar Materials." This is a far field test measurement taken using a coaxial cell. The dynamic range indicates the maximum measurement capability of our test setup, in other words the response of a "perfect" shield.

#### Frequency

Product	30 MHz	100 MHz	300 MHz	1 GHz	2.5 GHz	4.5 GHz
Amber Low E 35 (LE35AMARL)	37 dB	35 dB	34 dB	36 dB	36 dB	38 dB
Silver P18ARL (P-18ARL)	24 dB	22 dB	22 dB	24 dB	26 dB	27 dB
RE15SIXL	24 dB	23 dB	23 dB	25 dB	26 dB	28 dB
Neutral 35 (RE35NEARL)*	7 dB	7 dB	7 dB	7 dB	7 dB	8 dB
Amber 35 (RE35AMARL)	38 dB	35 dB	34 dB	36 dB	36 dB	38 dB
NV25*	11 dB	11 dB	13 dB	12 dB	13 dB	14 dB
Prestige series	No emi attenuation measured					
Dynamic Range	97 dB	97 dB	97 dB	97 dB	93 dB	86 dB

\*Negligible shielding properties

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