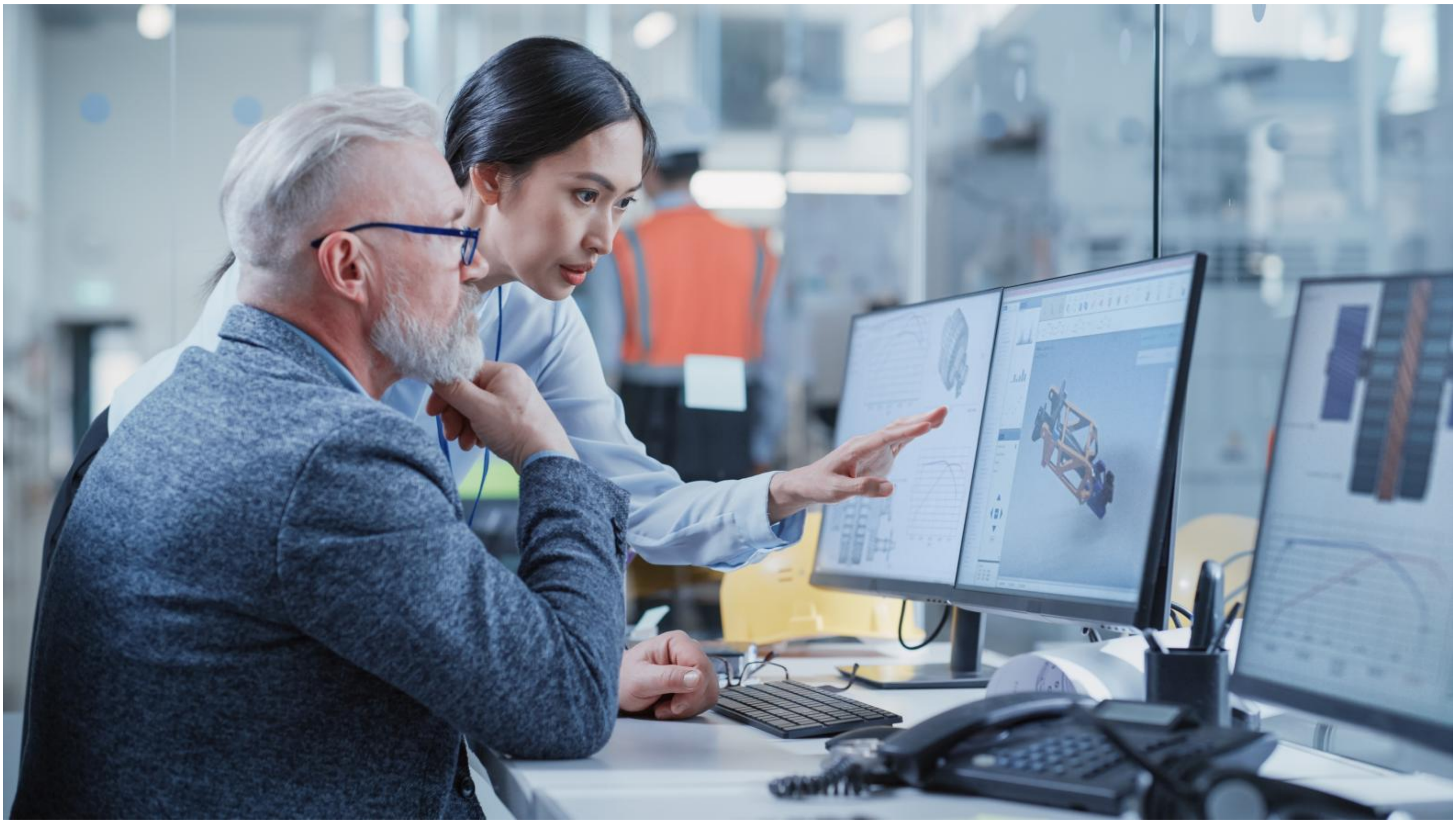
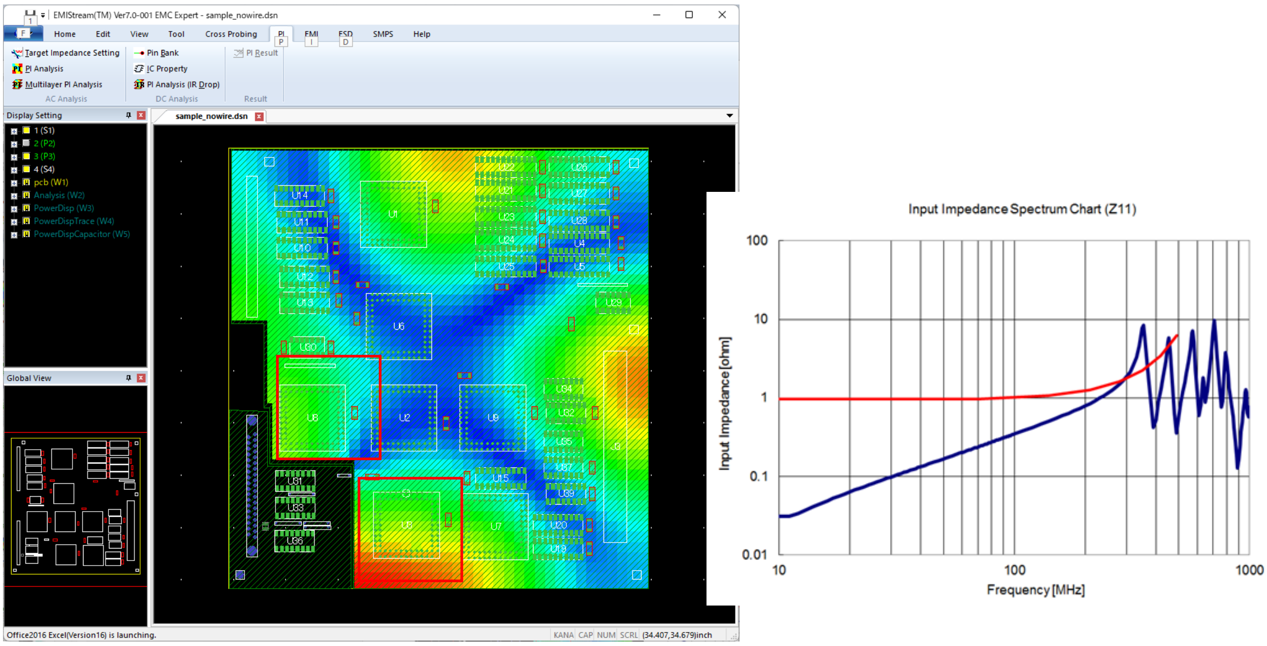
We support your power!!
Microwave Factory

CORNES
RF ENGINEERING

Power Integrity Design Assistance Tool

PIStream





Office2016 Excel(Version16) is launching.

Microwave Factory Co., Ltd. (MWF) and NEC Solution Innovator Co., Ltd. (NEC Solution Innovator) have agreed to merge NEC Solution Innovator's DEMITASNX into the MWF EMC business unit. The acquisition date is scheduled for April 1, 2026.

On printed circuit boards (PCBs), 'power supply noise' can occur as LSI voltages decrease and power consumption increases, potentially causing signal distortion and LSI malfunctions. PIStream provides powerful support for designs aimed at suppressing such power supply noise.

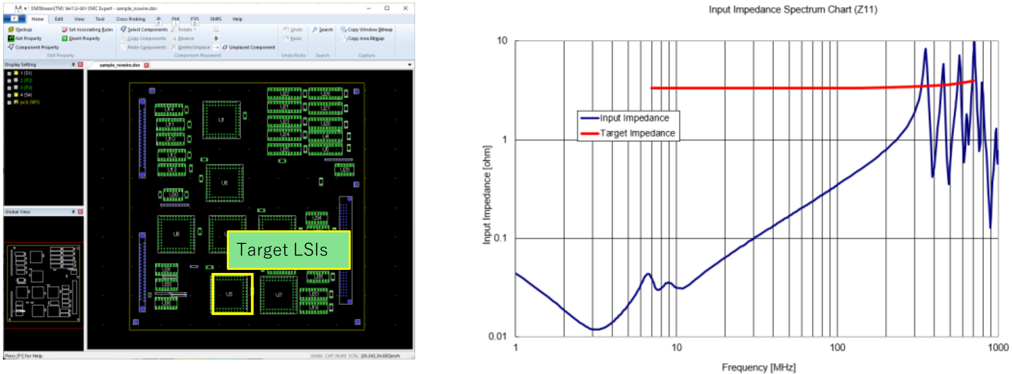
With an intuitive GUI and high-speed analysis algorithms, even designers facing tight development schedules or those unfamiliar with power integrity design can easily achieve designs that balance quality, cost, and analysis time.

Input Impedance Analysis

Preventing self-induced malfunctions caused by LSI operation

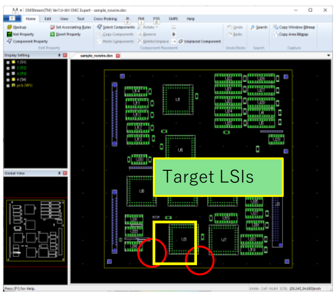
When the impedance between the LSI power supply and GND (power supply impedance) increases, sharp fluctuations in current consumption cause a significant voltage drop, which can lead to unstable operation or malfunctions.

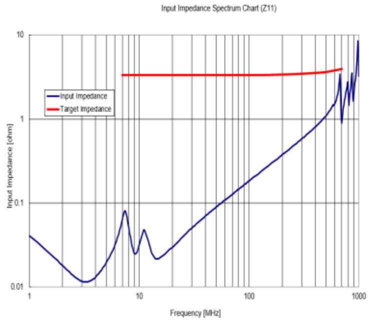
PIStream provides a detailed analysis of this power supply impedance. It strongly supports the evaluation of effective countermeasures to suppress impedance, such as optimizing decoupling capacitor placement, thereby preventing design rework.



Identify issues with the current component layout

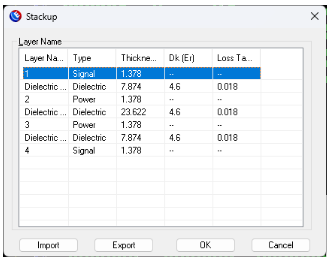
Measure 1: Capacitor Addition



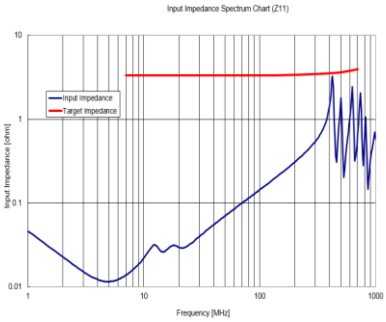


Capacitors were added around the target LSI (indicated by the red circles in the figure). This confirmed that the power supply impedance fell below the target impedance, verifying the effectiveness of adding the capacitors as a countermeasure.

Measure 2: Dielectric Thickness Modification



Layer Na...	Type	Thickne...	Dk (Er)	Loss Ta...
1	Signal	1.378	--	--
Dielectric ...	Dielectric	7.874	4.6	0.018
2	Power	1.378	--	--
Dielectric ...	Dielectric	23.622	4.6	0.018
3	Power	1.378	--	--
Dielectric ...	Dielectric	7.874	4.6	0.018
4	Signal	1.378	--	--

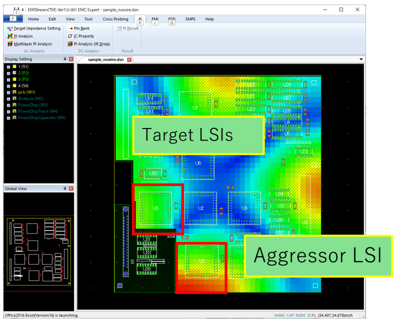


By reducing the dielectric thickness between the power and GND layers, the inter-plane capacitance increases, making it possible to suppress the power supply impedance below the target impedance.

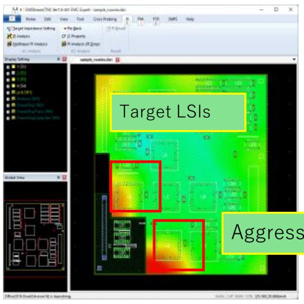
Transfer Impedance Analysis

■ Preventing malfunctions in other LSIs caused by LSI operation

When LSI-induced power supply noise coupling (transfer impedance) increases, voltage fluctuations triggered by the operation of the noise-source LSI also grow larger.
This analysis feature visualizes the impedance distribution across the board using a color gradient, making it easy to pinpoint noise propagation paths and vulnerable areas.
This enables reliable evaluation of countermeasures right at the design stage.

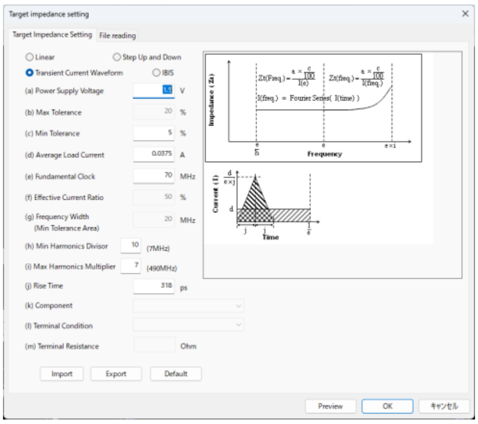


Due to the operation of the noise-source LSI, a localized increase in impedance (or voltage fluctuation) was observed around the target LSI (indicated by the warm-colored areas in the figure).
This poses a risk of causing the target LSI to malfunction.



Capacitors were added to the region near the target LSI where transfer impedance was high (indicated by the warm-colored areas in the figure).
As a result, a significant reduction in transfer impedance was confirmed, verifying that the risk of LSI malfunction due to noise interference has been successfully averted.

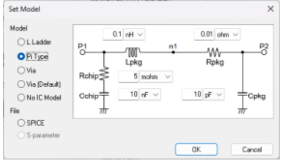
■ Simplified Analysis Settings GUI



Target impedance setting

○ Linear ○ Step Up and Down
● Transient Current Waveform ○ IBIS
(a) Power Supply Voltage 1.5 V
(b) Max Tolerance 20 %
(c) Min Tolerance 5 %
(d) Average Load Current 0.0375 A
(e) Fundamental Clock 70 MHz
(f) Effective Current Ratio 50 %
(g) Frequency Width (Min Tolerance Area) 20 MHz
(h) Min Harmonics Divisor 10 (7MHz)
(i) Max Harmonics Multiplier 7 (490MHz)
(j) Rise Time 318 ps
(k) Component
(l) Terminal Condition
(m) Terminal Resistance Ohm

The tool calculates the target impedance based on the LSI's supply voltage and power current waveform (estimated from the average current consumption and rise time).
For the frequency range configuration, it uses the fundamental operating frequency as a baseline to span from low frequencies up to high-frequency regions containing higher-order harmonics, enabling comprehensive power stability evaluation across a wide bandwidth.



Set Model

Model
○ L Ladder
● Pi Type
○ Via
○ Via (Default)
○ No IC Model
File
○ SPICE
○ S-parameter

Lpkg 0.1 nH
Rpkg 0.01 ohm
Rchip 5 mohm
Cchip 10 nF
Cpkg 10 pF

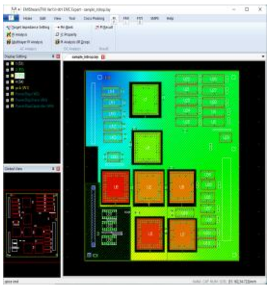
By configuring the LSI and IC package models, you can perform analysis that accounts for mid-frequency resonance.*

* Mid-frequency resonance refers to the resonance caused by the capacitance component of the semiconductor chip and the inductance components of the IC package and PCB.

IR Drop Analysis Function

■ DC Voltage Drop Analysis (DC Analysis)

Based on the LSI's current consumption, the software analyzes the IR drop (voltage drop) and current density from the power module to each device, displaying the results in an intuitive heat map.Because it can export a comprehensive list of voltage drop values for each individual LSI power pin, malfunction risks caused by insufficient voltage margins can be Identified at a glance.Furthermore, it supports current settings for individual power banks, enabling highly realistic and accurate analysis even for complex LSIs with power consumption that varies across different operating modes.



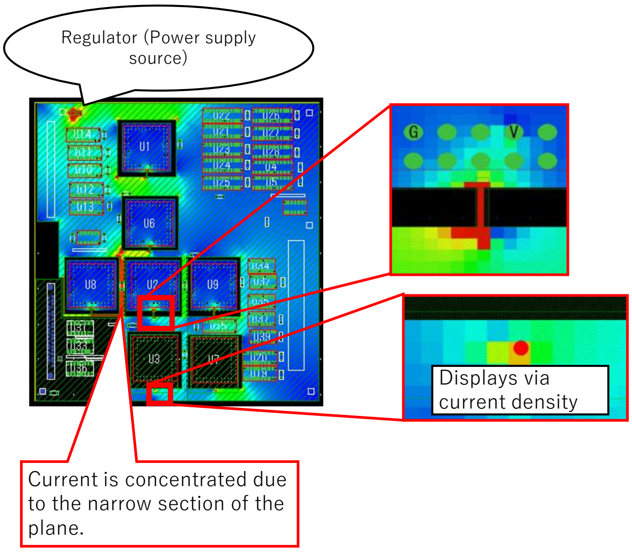
Displays the voltage drop on the plane as a color gradient.

instance	pin	value
U1	46	0.019734
U1	26	0.019734
U1	25	0.019734
U1	4	0.019734
U1	67	0.019734
U1	68	0.019734
U10	19	0.01159
U10	20	0.01159
U11	19	0.010955
U11	20	0.010955

LSI power pin voltage drop values

■ Current Density Visualization Function

Areas of high current concentration are displayed in warm colors, making it useful for designing power plane shapes.



Regulator (Power supply source)

Displays via current density

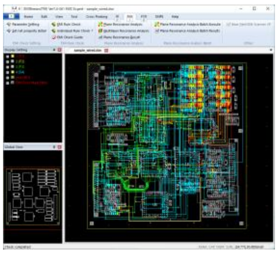
Current is concentrated due to the narrow section of the plane.

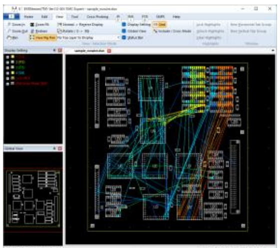
EMI Rule Check Function EMIStream

This function identifies the component placement, trace, and plane areas that cause EMI and proposes suppression measures for these areas. The rule check items in EMIStream were carefully selected because of their strong theoretical basis for generating EMI and were verified by NEC's research laboratories and by universities around the world based on a vast knowledge base of past EMI suppression measures. This was used to narrow down to 15 key design items

Key EMI Rule Check Items

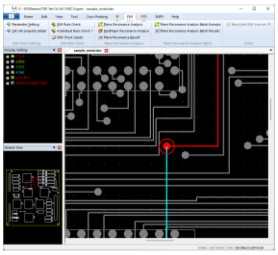
- ①Trace Length
- ②Via Count
- ③Reference Change
- ④Returm Current Path Discontinuity
- ⑤Traces Near Plane Edge
- ⑥Estimated Radiation
- ⑦SG Trace
- ⑧SG Via Spacing
- ⑨Grounding Vias Along Plane Outline
- ⑩Filter
- ⑪Decoupling Capacitor
- ⑫Differential Signal
- ⑬XTalk
- ⑭Digital/Analog Interference
- ⑮IC Ground Split

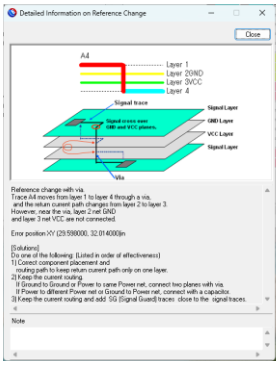

〈Data check after tracing〉


〈Data can also be checked at the placement review stage〉

■ EMI rule check advice function

This function lists the nets containing large numbers of EMI rule check errors in order. Error marks are displayed at each error location in the nets for enabling the user to visually assess the problem areas. For each error location, the error details are explained using pictures and text,and the proposed corrective action for the error is also provided.





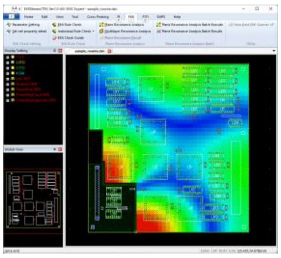
Reference change with via.
Trace A4 moves from layer 1 to layer 4 through a via,
and the return current path changes from layer 2 to layer 3.
However, near the via, layer 2 net GND
and layer 3 net VCC are not connected.

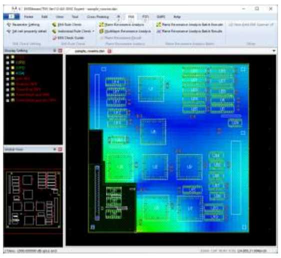
Error position XY (29.598000, 32.014000)in

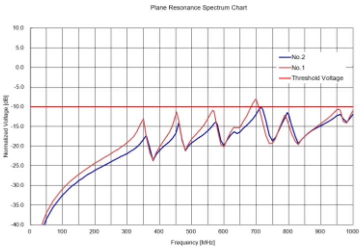
[Solutions]
Do one of the following: (Listed in order of effectiveness)
1) Correct component placement and
routing path to keep return current path only on one layer.
2) Keep the current routing.
If Ground to Ground or Power to same Power net, connect two planes with via.
If Power to different Power net or Ground to Power net, connect with a capacitor.
3) Keep the current routing and add SG (Signal Guard) traces close to the signal traces.

■ Power/Ground Resonance Analysis Function

This function analyzes resonance between the power supply and ground plane, which is a major cause of EMI. The analysis results can be confirmed frequency characteristics and volage distribution. The frequency characteristics allow the user to confirm the harmful frequencies and the magnitude the resonance voltage. In the voltage distribution display, locations with large resonance voltages are indicated in warm colors, making it easy determine the placement of suppression measure components. The automatic capacitor placement function automatically places capacitors of the optimum capacitance at the appropriate locations.







Operating Environmant

OS	Windows11 64bits
CPU	Intel Core i3 or higher
Memory	1GB or more
Storage	System: 200MB + Data storage (200MB or more recommended)
Others	Microsoft 365 Apps for enterprise

Support Layout CAD

Cadence Design System	Allegro / OrCAD
ZUKEN	CR-8000 Design Force / CR-5000 Board Designer / CADVANCE
Siemens	Xpedition / PADS Layout / Board Station
Altium	Altium Designer
Others	CAD supporting ODB++ output

For inquiries,please contact

We support your power!!
Microwave Factory
CORNES
RF ENGINEERING

CRFE EMIStream Contact
http://www.mwf.co.jp/en/products/software/emistream.html
E-mail：emistream_contact@cfre.jp