

4FHP0435E63L2 Data Sheet

Abstract

The 4FHP0435E63L2 is a solution based on Firstack digital technology designed for a two-level, dual-parallel configuration of EconoDUAL™-packaged IGBTs. The module features a center-to-center spacing of 63.5 mm, a peak drive current of ± 35 A, and a single-channel drive power of 2 W per module. It includes features such as short-circuit protection, soft shutdown, and intelligent fault management.

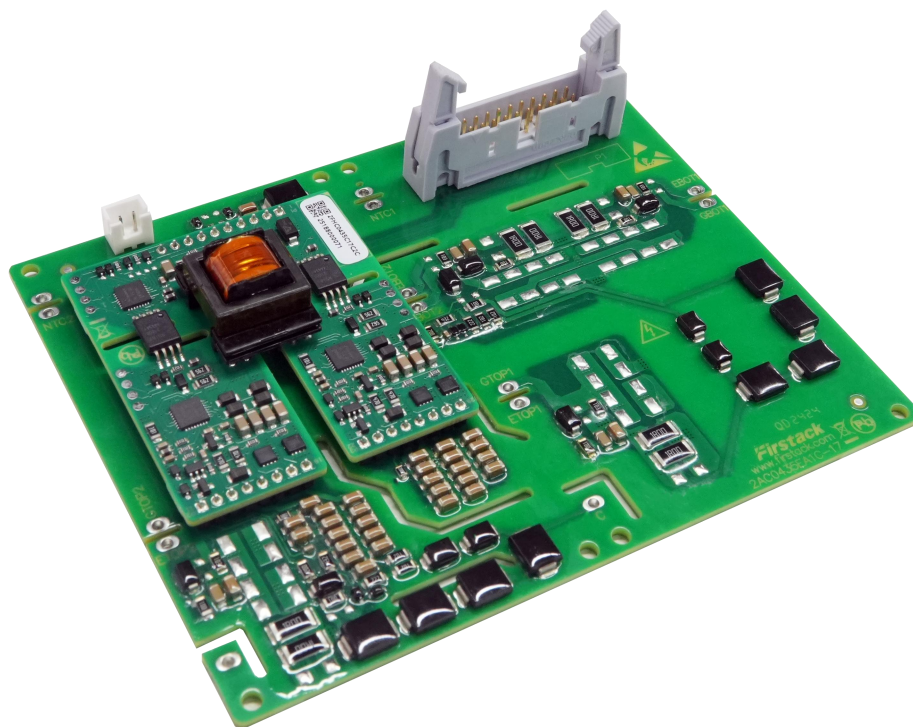


Figure 1 Product Example

Key Advantages:

- ✓ 2W per channel, ± 35 A
- ✓ Applications supporting up to 50 kHz
- ✓ Short-Circuit Protection(Soft Shutdown)
- ✓ UVLO
- ✓ Fault Classification

Typical Applications:

- ✓ Power Quality
- ✓ Special-purpose power supplies
- ✓ Switching Power Supplies
- ✓ Inverters

Functional block diagram

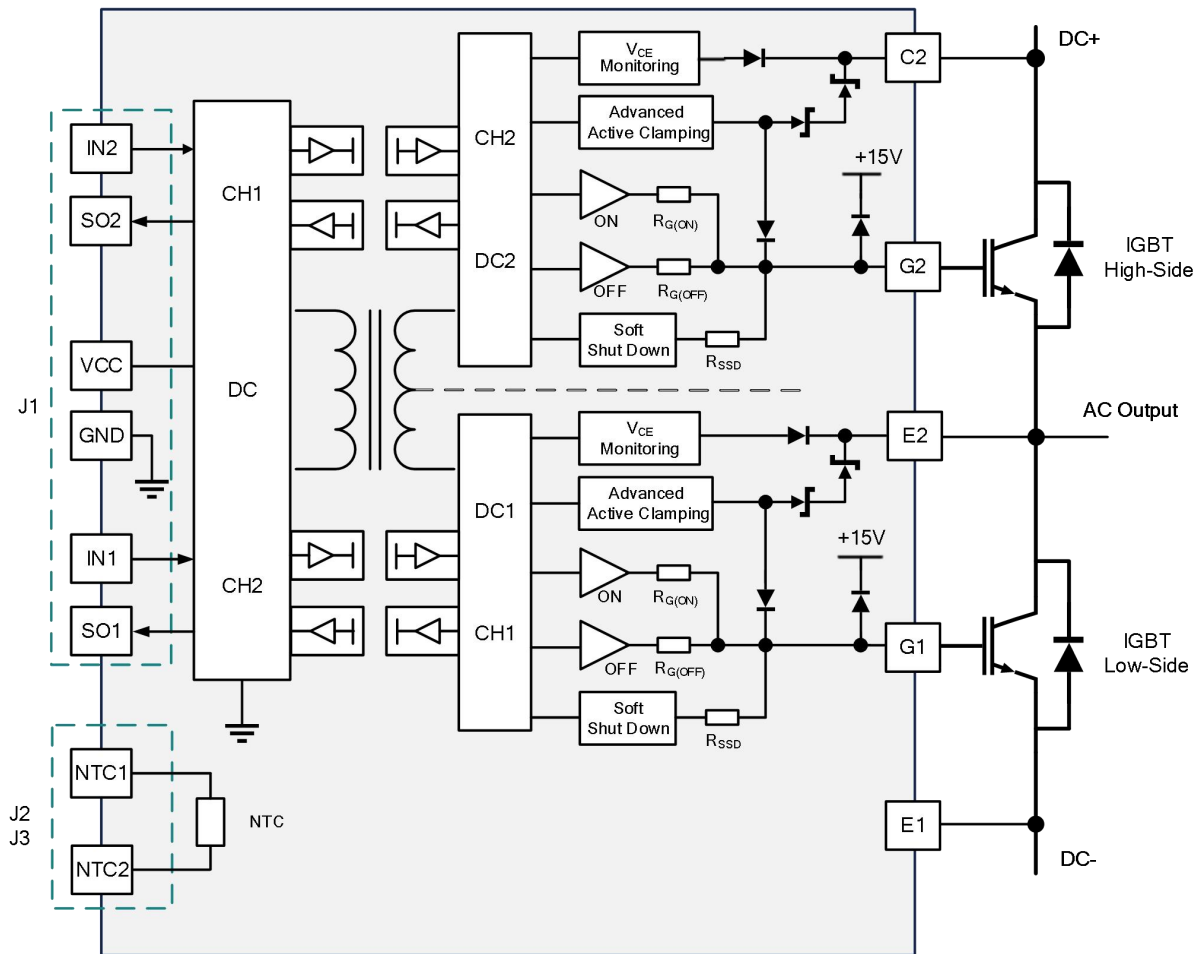
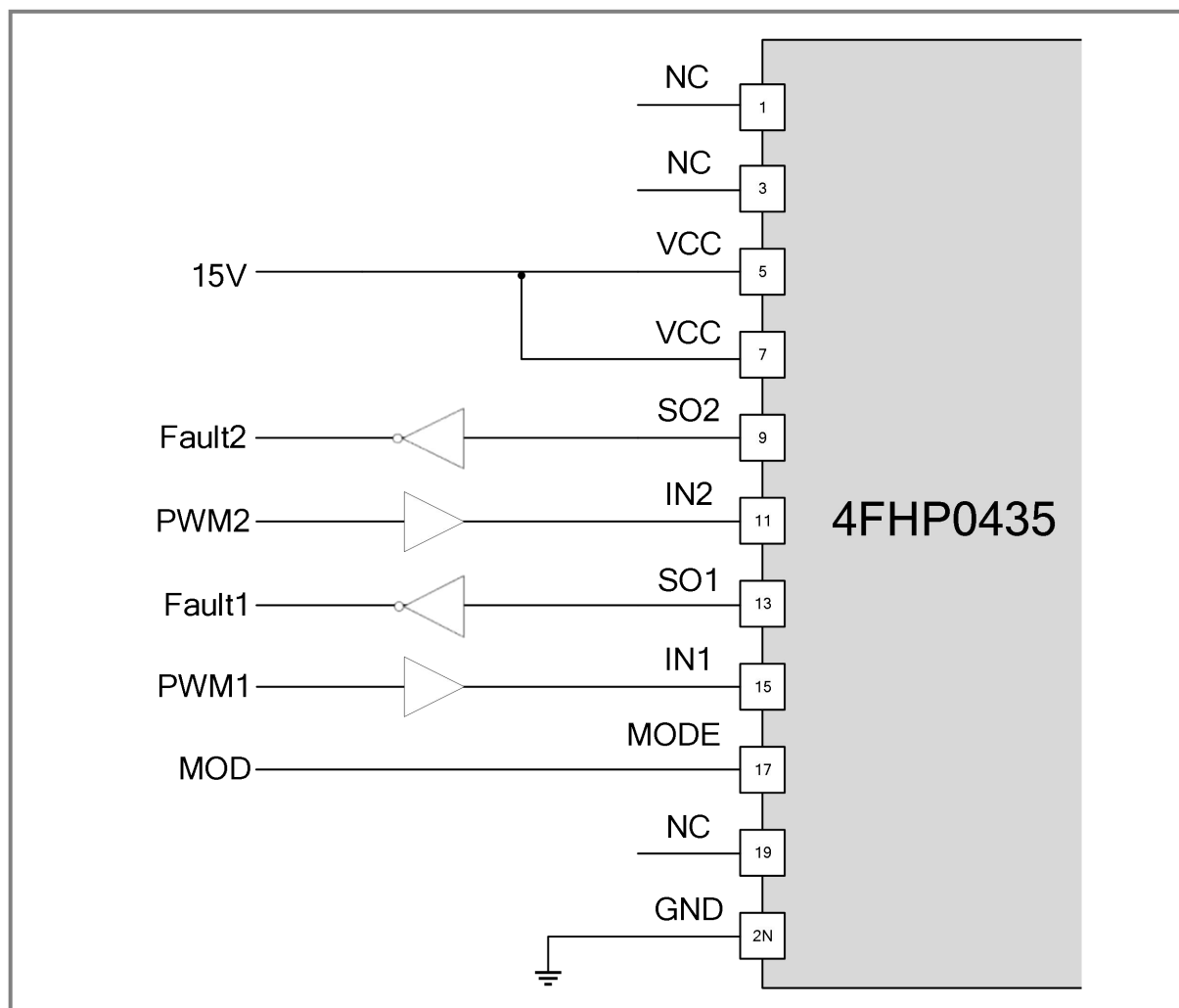


Figure 2 Functional block diagram

Recommended Interface Circuit for Connector J1



J1 Terminal Pin Definitions

Pin	Definition	Function	Pin	Definition	Function
1	NC	Free	2	GND	Primary-side reference ground
3	NC	Free	4	GND	Primary-side reference ground
5	V _{DC}	Power supply input	6	GND	Primary-side reference ground
7	V _{DC}	Power supply input	8	GND	Primary-side reference ground
9	SO2	Channel 2 status output	10	GND	Primary-side reference ground
11	IN2	Channel 2 signal input	12	GND	Primary-side reference ground
13	SO1	Channel 1 status output	14	GND	Primary-side reference ground
15	IN1	Channel 1 signal input	16	GND	Primary-side reference ground
17	NC	Free	18	GND	Primary-side reference ground
19	NC	Free	20	GND	Primary-side reference ground

Technical Specifications

Parameter	Description	Min.	Max.	Unit
Supply Voltage V_{DC}	To Ground	0	15.5	V
Input/Output Logic Levels	To Ground	0	15.5	V
Fault Return Port Current Capacity	In fault condition	0	10	mA
Single-channel output power (Per Module)	@85°C		2	W
Maximum gate output current	@85°C	35	35	A
Test Voltage (50 Hz/1 min)	Primary to secondary	5000		V_{RMS}
	Secondary to secondary	4000		V_{RMS}
Maximum DC bus voltage			1200	V
Operating temperature		-40	85	°C
Storage Temperature		-40	90	°C

Recommended Operating Conditions

Parameters	Description	Min.	Typ.	Max.	Unit
Supply Voltage V_{DC}	V_{DC} to GND	14.5	15	15.5	V
Power Supply Current I_{DC}	Without load		0.11		A
Coupling Capacitance C_{IO}	Primary to secondary side		18		pF
Undervoltage threshold	Power supply		12		V

Gate Drive Parameters

Output Level	Description	Min.	Typ.	Max.	Unit
Gate Voltage V_{GE}	Turn on (ON)	14.5	15	15.5	V
Gate voltage V_{GE}	Turn off (OFF)	-6	-7	-8	V

Input/Output Logic

Parameters	Description	Min.	Typ.	Max.	Unit
Input Signal INx	Reference ground	4.5	15	15.5	V
Input Impedance			4.7		K Ω
Turn-on Threshold	V(INx)	3.2			V
Turn-off threshold	V(INx)			1.1	V
Fault Output SOx	Protection status @ Io < 10 mA			0.35	V

Short-Circuit Protection

Parameter	Description	Min.	Typ.	Max.	Unit
V _{CE} Monitoring Threshold	Short-Circuit Protection Monitoring Threshold @R _{thx} =68 k Ω		10.1		V
Response Time ^①	CH1		8.4		us
	CH2		8.4		us
Soft shut down time	Soft shut down action time		4.16		us

Time characteristics

Parameter	Description	Min.	Typ.	Max.	Unit
Turn-on delay ^②			650		ns
Turn-off delay ^③			800		ns
Rise time ^④			10		ns
Fall time ^⑤			20		ns
Fault blocking time			80		ms
Fault Recovery Time			10		ms

Electrical Insulation

Parameter	Description	Min.	Typ.	Max.	Unit
Creepage Distance ®	Primary and secondary sides	8			mm
	Secondary-to-secondary	8			mm
Clearance distance	Original secondary side	8			mm
	Secondary-to-secondary	6.5			mm

Unless otherwise specified, the above data are based on tests conducted at an ambient temperature of 25°C and a DC voltage of 15 V.

Notes:

1. Response Time: The short-circuit protection response time refers to the time from the occurrence of a fault to the initiation of soft shutdown;
2. Turn-on delay: The time required for the rising edge of the PWM signal from the primary side to be transmitted to the rising edge of the secondary-side gate driver;
3. Turn-off delay: The time required for the falling edge of the PWM signal at the primary side to be transmitted to the falling edge of the secondary-side gate driver;
4. Rise Time: The time required to rise from 10% of the gate turn-off voltage (-7 V) to 90% of the gate turn-on voltage (+15 V);
5. Fall time: The time required to go from 90% of the gate turn-on voltage (+15 V) to 90% of the gate turn-off voltage (-7 V);
6. Creepage distance: In accordance with IEC 61800-5-1-2007, meets the basic insulation requirements for an altitude below 2 km and pollution degree 2; this value is taken from the creepage distance of the capacitive coupling device.

Indications of Gate Resistor and Capacitor Locations

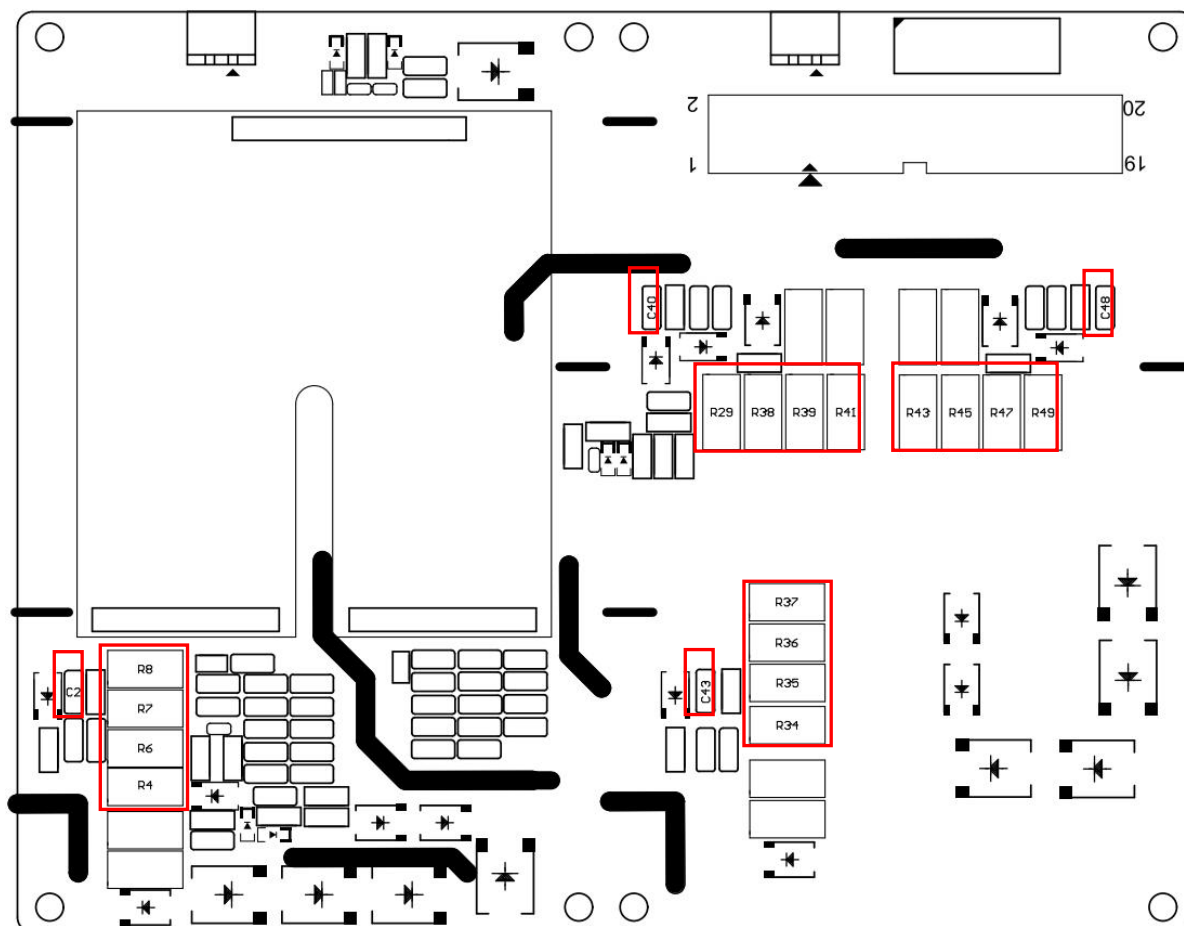


Figure 3: Gate resistor and capacitor position indication

Formulas for Calculating Gate Resistor and Capacitor Values

Parameter	R_{GON}	R_{GOFF}	C_{GE}
CH2	$R7//R8; R36//R37$	$R4//R6; R34//R35$	$C2; C43$
CH1	$R29//R38; R47//R49$	$R39//R41; R43//R45$	$C40; C48$

Recommended Resistor Specifications

Selection	Power	Manufacturer	Package	Power Rating per Resistor	Dimensions
1	<2W	YAGEO	2512 SMD	2W	Length x Width: 3.2 mm x 1.6 mm

Gate Resistance Table for Common Modules

IGBT Model	R _{GON} (Ω)	R _{GOFF} (Ω)	C _{GE} (nF)
FF450R17ME4	3.75	5	NC
2MBI450VN-170-50	3.75	5	NC
DIM450M1HS17-PA500	3.75	5	NC
FF600R17ME4	3.75	5	NC
2MBI600VN-170-50	3.75	5	NC
DIM600M1HS17-PA500	3.75	5	NC
TG600HF17M1-S300	3.75	5	NC

*The resistance values in the table above are recommended reference values

Mechanical Dimensions

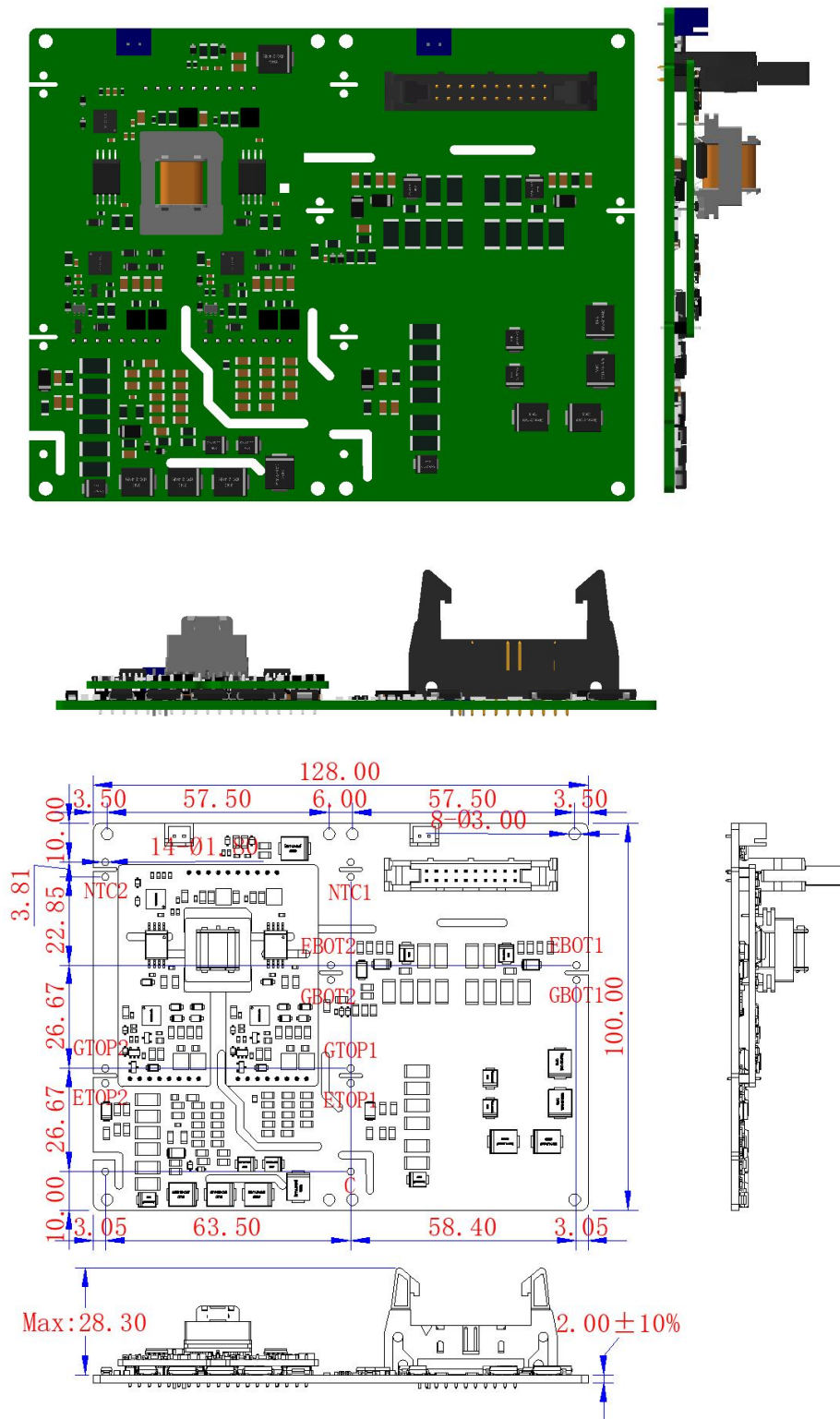


Figure 4: 3D Structure and Dimensions

Note: 1. The thickness tolerance of the board is $\pm 10\%$.

2. Other dimensional tolerances refer to GB/T1804-m.

Ordering Information

The 4FHP0435E63L2 supports EconoDUAL™ package modules from multiple manufacturers and in various models. If the products in the selection list do not meet your requirements, please contact the Firstack sales department for customization.

Driver Model	MOD	Sox	Remarks
4FHP0435E63L2	Direct	OD	Short-circuit detection time: 8 us
4FHP0435E63L2-Y0001	Half-bridge	OD	Short-circuit detection time: 8 us
4FHP0435E63L2S1	Direct	OD	Short-circuit detection time: 6 us

Technical Support

Firstack's professional team is here to provide you with business consulting and technical support. If you have any needs, please contact the Firstack technical sales team to obtain application manuals and learn more about technical applications.

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