VIAVI Solutions

Data Sheet

VIAVI

ATE5800 Series

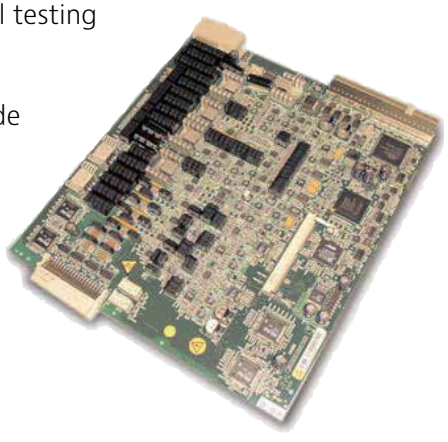
Multi-Functional Card (MFC)

The Multi-Functional Card is a versatile instrument that provides a number of commonly used test and measurement functions.

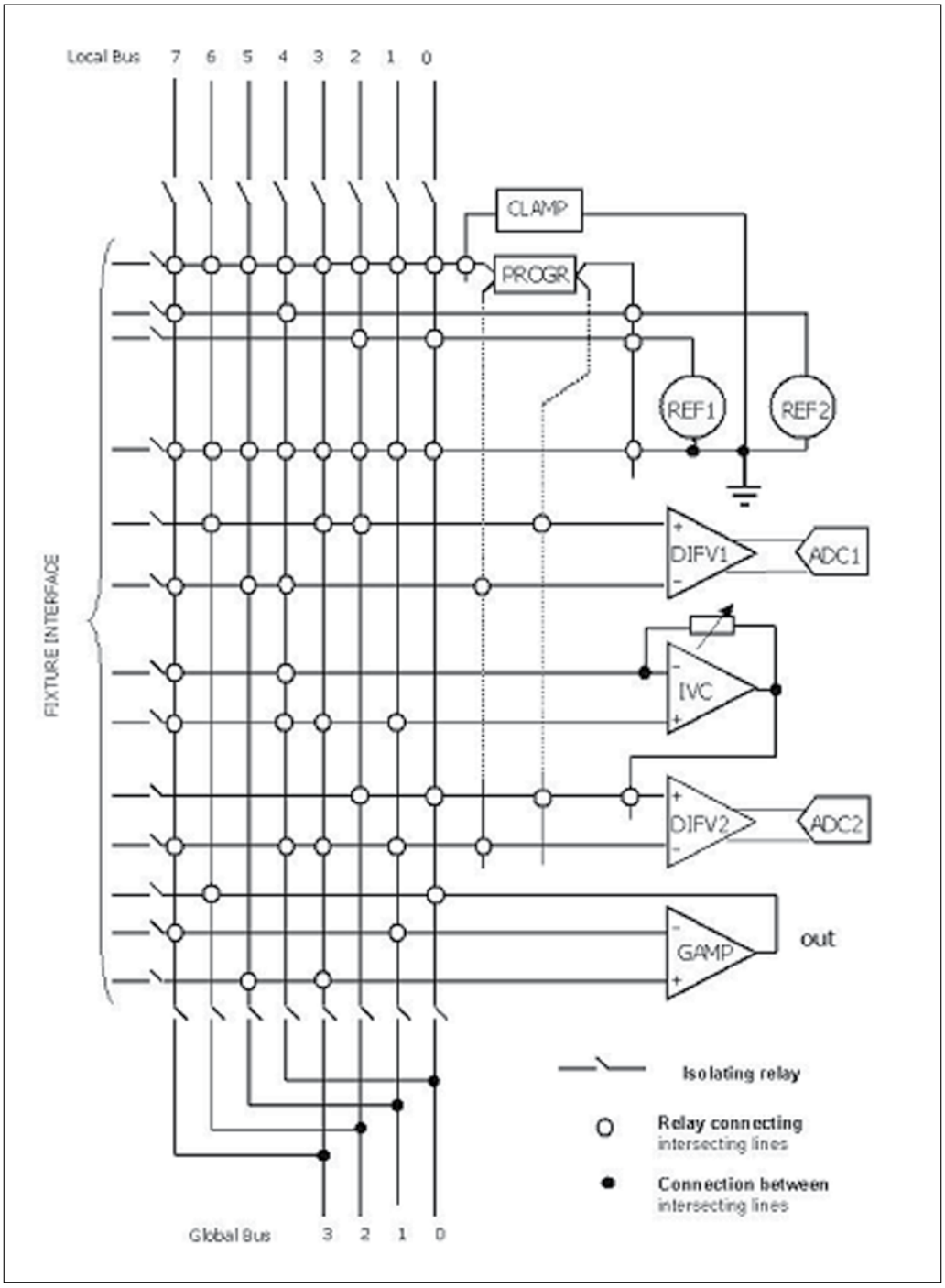
- Two Channel Reference Generator
- Two Channel Differential Voltmeter
- Voltage Measurement +/- 100V
- Programmable Resistance
- Guard Amplifier
- Current to Voltage Converter
- Over Voltage Protection
- Fast measurement execution

The MFC forms the heart of an ATE5800 Series analog test system. It provides the stimulus and measurement circuitry to enable analog in-circuit tests to be carried out in conjunction with a num-ber of Test Point Relay cards (from 1 to 18). The card can also act as a general purpose DC and AC signal source and signal measurement facility for functional testing, with additional connections via a fixture interface.

In any given ATE5800 Series test system a number of MFC's can be fitted into the 19 available instrument slots to form separate analog subsystems. These analog subsystems then allow parallel testing of test subjects, reducing overall test times and increasing throughput.



The modular design of the MFC allows many types of measurement to be made with the automatic configuration of the internal modules via a relay matrix. The DTC has an internal clock speed of 200 MHz, allowing vector rates of 10 MHz with 5 ns edge placement, this specification allows comprehensive testing of the most complex and demanding devices today.



Module Functionality

- Capacitor Discharge
- Contact
- Track/Shorts
- Link/Opens
- AC Impedance Measurement
- AC Low Impedance Measurement
- DC Resistance Measurement
- DC Low Resistance Measurement
- DC Capacitance Measurement
- DIODE ON/OFF/Leakage
- LED ON/OFF/Leakage
- ZENER
- TRAN ON/OFF/HFE
- FET ON/OFF/RDS
- TRANSFORMER RATIO
- DC Voltage
- AC Voltage
- DC Current
- AC Current
- CODA Vectorless Test

Each channel is separately capable of generating programmable DC signals, or AC signals with a DC offset. The output stage has programmable current limits that enable it to operate as a current source and a current sink up to 250 mA. The sink and source limits are controlled separately and a monitor line indicates when either part is in current limit.

AC signals are synthesised by the on board DSP writing data to a digital to analog converter (DAC). The output of this DAC can be routed through a programmable low pass filter, to produce high integrity signals.

High frequency sinewaves needed for functional testing are generated by using direct digital synthesis together with a multiplying DAC to provide amplitude control. A further DAC provides a DC offset capability.

The outputs of the reference generators are switchable for low and high gains to allow accurate low level signals to be generated as well as high level. This gain control can be utilised with the current to voltage converter (IVC) to provide an autorange facility.

The autorange feature can be used to automatically reduce the stimulus voltage when the output current from the tested device rises near full scale. In addition, the output stage of REF1 includes a discharge buffer, which can be switched in to discharge capacitors on the unit under test (UUT). This buffer is able to withstand high voltages across capacitors of a UUT, and provide a means of safely discharging them.

Current to Voltage Converter (IVC)

The current to voltage converter consists of an operational amplifier with the inverting input used as the current terminal, and the noninverting input used as the reference. The operational amplifier has a current drive capability of up to 250 mA to allow quick settling time for measurements.

A two stage pre-charge facility reduces the feedback resistance to rapidly charge capacitors being measured on low current ranges. Separately switchable feedback capacitors are also included to increase the immunity to oscillation.

Differential Voltmeter (DIFV1/DIFV2)

The MFC has two identical differential voltmeter channels, DIFV1 and DIFV2. Each has a switchable divider, two programmable gain stages, a programmable lowpass filter, and a differential drive with fixed frequency anti-aliasing filter to a 16-bit ADC circuit.

The attenuation and gain have separate controls so that common mode voltages above 5V can be accommodated by using the ¸10 divider and the gain together. Several input voltage ranges from ±10mV to ±100V full-scale can be achieved.

The ADC sampling and reading is controlled by the DSP to allow synchronous generation and analysis to be carried out. In addition the MFC includes two voltage comparators with programmable threshold levels to provide an indication when the measured voltage rises above or falls below the pre-set levels. This is used to control automated sequences, which use the comparator to indicate when the voltage level crosses a defined level or is within a window. The same two threshold levels are applied to both voltmeter channels.

Programmable Resistor (PROGR)

A parallel configuration of relay switchable resistors, with decade values from 1 Ohms to 10 MOhms are provided to be used in series with the reference generator output in order to provide an AC current source, and also to act as reference components in low impedance measurements.

Three capacitor values are also included (1 nF, 10 nF and 100 nF) to connect instead of, or in parallel with the resistance. The components used are accurate and stable types to enable these devices to be used as reference components for calibration purposes.

A clamp circuit can be connected between the output side of the programmable resistor, to prevent any damaging high voltage on the output.

Guard Amplifier (GAMP)

This buffer amplifier is used to drive a guard pin(s) with the reference generator signal to nullify the effect of parallel paths on the UUT.

Analog Multiplexers

Two analog multiplexers are on the MFC, one to route each differential voltmeter channel to a number of inputs on the fixture interface connector. These inputs are protected and have a limited voltage range. Each multiplexer can be configured to provide 8 differential inputs, or 16 single ended inputs by switching the - input to GND.

Fixture Grounding

Four pins on the fixture interface connector are connected to 0V (GND) via relays. REF1 and DIFV1 can be used to measure the resistance to 0V on internal analog bus line 0. By closing the relays in sequence each may be checked for stuck closed or stuck open condition.

Specifications

Reference Generator (REF1/REF2)	
Voltage range	-10 V to +10 V DC
	Low range: 0.01 to 1 V AC peak
	High range: 1 to 10 V AC peak
Resolution	16-bit normal
	12-bit DDS
Accuracy (DC)	±1% ±5 mV
AC Accuracy (standard frequencies)	High range: ±1% ±10 mV
	Low range: ±1% ±1 mV
Frequency (sine wave)	0.1 Hz to 50 kHz normal
	1 Hz to 200 kHz DDS
AC distortion	Typically better than 0.2%
Settling time	Typically less than 50 µsec
Current ranges	10 to 250 mA (high range)
	0.1 to 10 mA (low range)

Specifications (continued)

Reference Generator (REF1/REF2) (continued)	
Resolution	14-bit
Accuracy (DC)	100 uA to 10 mA: ±1% ±15 uA
	10 mA to 250 mA: ±1% ±0.3 mA

Differential Voltmeter (DIFV1/DIFV2)			
Range	±100 mV to ±100 V full scale peak in 7 ranges		
Input protection	±100 V		
DC Accuracy	**Range**	**Without Filter**	**With Filter**
	100 V	±0.5% of reading	±10 0mV ±0.6% of reading ±200 mV
	25 V	±0.5% of reading	±25 mV ±0.6% of reading ±50 mV
	10 V	±0.4% of reading	±10 mV ±0.5% of reading ±20 mV
	2.5 V	±0.4% of reading	±2.5 mV ±0.5% of reading ±5 mV
	1 V	±0.5% of reading	±1 mV ±0.6% of reading ±2 mV
	0.25 V	±0.5% of reading	±0.5 mV ±0.6% of reading ±1 mV
	100 mV	±0.5% of reading ±0.2 mV	±0.6% of reading ±0.4 mV
AC Accuracy	**Range**	**Without Filter**	**With Filter**
	100 V	±2% of reading	±200 mV ±4% of reading ±400 mV
	25 V	±2% of reading	±50 mV ±4% of reading ±100 mV
	10 V	±2% of reading	±20 mV ±4% of reading ±40 mV
	2.5 V	±2% of reading ±5 mV	±4% of reading ±10 mV
	1 V	±2% of reading ±2 mV	±4% of reading ±4 mV
	0.25 V	±2% of reading ±0.5 mV	±4% of reading ±1 mV
	100 mV	±2% of reading ±0.2 mV	±4% of reading ±0.4 mV
Resolution	16-bit		
Bandwidth	200 kHz, approximately		
Test speed	Up to 700 tests per second		
Noise Filter	8 pole elliptic, programmable cut-off frequency between 10 kHz and 150 kHz in steps of 10 kHz		
Anti-alias filter	Switchable between linear amplitude (3-pole Butterworth) and linear phase		
Input resistance	100 V & 25 V Ranges		
	Nominally 10 MW to ground at each terminal/20 MWs differential		
Other ranges	Nominally 1 MW to ground at each terminal/2 MW differential or >100 MW selectable		

Current to Voltage Converter (IVC)	
Current ranges	0 to ±2.5 uA, up to ±250 mA in 6 ranges
DC accuracy	±2% of reading ±0.1% full scale
Bandwidth	DC to 100 kHz depending on Frequency

Specifications (continued)

Programmable Resistor (PROGR)	
Resistance values	1 W
	10 W
	1 KW
	10 KW
	100 KW
	1 MW
	10 MW
Accuracy	±2.5% (1 W to 100 W)
	±1.5% (others)

*Warranted figures over the operating temperature range of the system (+10° C - +35° C)

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30187345 902 1018