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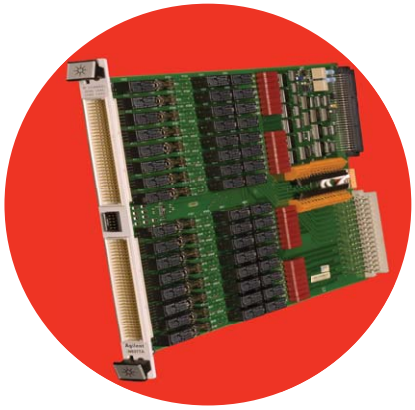
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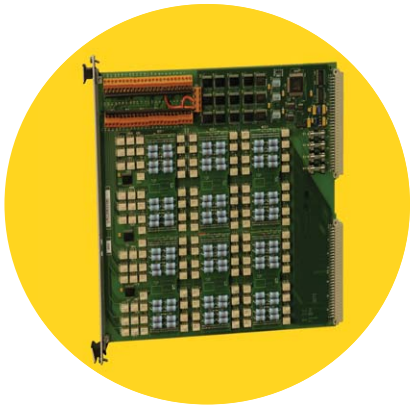
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Agilent TS-5000 Family
Multi-Channel Loadcards

Data Sheet

Agilent Technologies

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Figures 1, 2 and 3 below exhibit circuit diagrams on how single, dual and quad-load loadcards function respectively.

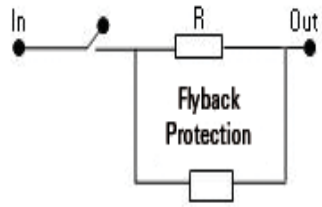


Figure 1. Single-load

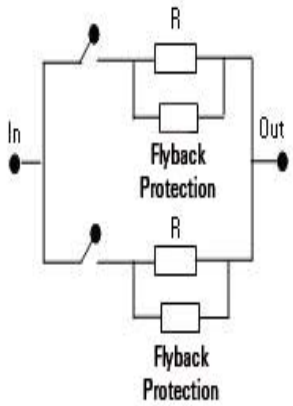


Figure 2. Dual-load

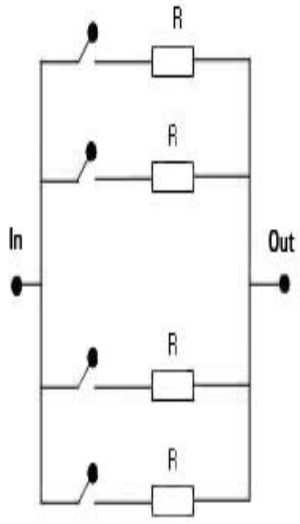


Figure 3. Quad-load

Agilent Technologies' TS-5000 family loadcards are a cost-effective and reliable set of multi-channeled loadcards designed specifically for automotive functional testing.

It offers a wide range of loadcards with up to 48 addressable channels, covering from low resistance to high current. The high current loadcards offer flyback protection while utilizing reliable reed relays with power bus to supply power to load.

The TS-5000 family offers single, dual and quad-load loadcards, each allowing you to connect to internal and externally defined load values. The multiple types of loadcards offered are categorized as follows:

Single-Load Loadcards

E6175A: 8-channel, single-load
E6176A: 16-channel, single-load
E6177A: 24-channel, single-load
E6178B: 8-channel, single-load

Dual-Load Loadcards

N9377A: 16-channel, dual-load
N9379A: 48-channel, dual-load

Quad-Load Loadcard

N9378A: 24-channel, quad-load

The TS-5000 family loadcards work well with Agilent E6198 programmable Switch/Load Unit (SLU), with up to 21 slots of optional Agilent plug in cards. This programmable SLU can also be used for instrumentation switching, as well as switching power supply and loads to the electronic control module (ECM).

With the TS-5000 family loadcards, your test engineers can choose their own load devices for any specific testing requirement that they may have.

A flexibility like this allows the application of loads that are more than just resistors, for example, reactive loads with inductors or capacitors can also be fitted for an ECM application that requires emulation. The TS-5000 family loadcards also have the ability to provide flyback protection for high current handling.

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General Specifications

Agilent Loadcards Specifications

Function	E6175A	E6176A	E6177A	E6178B	N9377A	N9378A	N9379A
Number of channels (maximum)	8	16	24	8	16, dual-load	24, quad-load	48, dual-load
Number of channels - unshared relays	4	16	24	8	16	24	48
Maximum current per channel	7.5 A (15 A peak)	7.5 A (15 A peak)	3 A	30 A	7.5 A (15 A peak)	2 A	2 A
Current measuring with sense resistor	Yes	Yes	No	No	Yes	No	No
Current measuring with current transducer	Yes	No	No	Yes	No	No	No
Flyback protection available (user installed)	Yes	Yes	No	Yes	Yes	No	No
Engineered for application	Inductive load	Common load	Low current	High current	High current dual-load	Low current quad-load	Low current quad-load

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Switching Specifications

Agilent Single-Load Loadcards Specifications

Function	E6175A	E6176A	E6177A	E6178B
Path resistance from power bus to loadcard connect	0.25 Ω maximum	0.4 Ω maximum	0.5 Ω maximum	0.030 Ω typical, 0.075 Ω maximum
Load path relay operate/release time	10/8 msec typical, 16/10 msec maximum, 30 cps maximum	10/8 msec typical, 16/10 msec maximum, 30 cps maximum	3.3/2.4 msec typical, 8/8 msec maximum, 10 cps maximum	15/10 msec typical, 20 cps maximum without load, 6 cpm maximum with rated load
Peak voltage to earth	60 V continuous 500 V maximum transient, non-switching (delays to < 60 V in 200 mS)	60 V continuous 500 V maximum transient, non-switching (delays to < 60 V in 200 mS)	60 V continuous 500 V maximum transient, non-switching (delays to < 60 V in 200 mS)	60 V continuous
Load carry/switching current (per channel)	7.5 A maximum non-switching, continuous	7.5 A maximum non-switching, continuous	3 A maximum	30 A maximum (1)
Load carry peak current (non-switching)	15 A maximum, (< 100 msec, < 2% duty cycle)	15 A maximum, (< 100 msec, < 2% duty cycle)	6 A maximum, (< 100 msec, < 2% duty cycle)	200 A maximum, (< 100 mS, < 2% duty cycle (1))
Load switching power	150 W maximum, resistive load	150 W maximum, resistive load	60 W maximum, resistive load	500 W maximum @ 25 Vdc maximum resistive load; 100 W maximum @ 40 Vdc maximum resistive load
Load switching voltage	60 V maximum	60 V maximum	60 V maximum	40 V maximum, V*I not to exceed load switching power (2)
Minimum permissible load	1 mA, 1 V	1 mA, 1 V	10 uA, 10 mV DC	N/A
Basic current sense accuracy with standard 0.05 W sense resistor	0.1% maximum	0.1% maximum	0.1% maximum	0.1% maximum

(1) One channel at a time. Special accessories required to support multi-channel 30 A load switching at any one time.
(2) Exclusive of load

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Agilent Multi-Load Loadcards Specifications

Function	N9377A	N9378A	N9379A
Switch topology	16-channel / 2 loads per channel, off-board loads	24-channel / 4 loads per channel with common, on-board loads	48-channel / 2 loads per channel with common, on-board loads
Path resistance channel to common	N/A	0.130 Ω maximum	0.300 Ω maximum
Path resistance from power bus to loadcard connect	0.4 Ω maximum	0.5 Ω maximum	0.5 Ω maximum
Load path relay operate/ release time	10/5 msec maximum, 30 cps maximum	4/4 msec maximum, 10 cps maximum	4/4 msec max, 10 cps maximum
Peak voltage to earth	60 V continuous 500 V maximum transient, non-switching (delays to < 60 V in 200 mS)	60 V continuous 500 V maximum transient, non-switching (delays to < 60 V in 200 mS)	60 V continuous 200 V maximum transient, non-switching (delays to < 60 V in 200 mS)
Load carry/switching current (per channel)	7.5 A maximum non-switching, continuous	2 A maximum	2 A maximum
Load carry peak current	15 A maximum, non-switching (< 100 msec, < 2% duty cycle)	1 A maximum	1 A maximum
Load switching power	150 W maximum, resistive load	N/A	N/A
Load switching voltage	60 V maximum	30 V maximum (relay switching)	30 V maximum (relay switching)
Minimum permissible load	10 mA, 5 V	10 uA, 10 mV DC	10 uA, 10 mV DC
Basic current sense accuracy with standard 0.05 Ω sense resistor	0.1% maximum	N/A	N/A
Basic current sense accuracy with different amplifier engaged (Vcm = 0 V)	0.2% + 30 mA	N/A	N/A
Basic current sense accuracy with different amplifier engaged (Vcm = 16 V)	0.2% + 100 mA	N/A	N/A
Isense differential amplifier 3 dB bandwidth	500 kHz typical	N/A	N/A
Isense differential amplifier slew rate	40 A/uS typical	N/A	N/A
Power dissipation, individual load mounted on loadcard	N/A	2 W maximum, each load	2 W maximum, each load
Average power for loads mounted on loadcard	N/A	20 W maximum total, per card	20 W maximum total, per card

(1) One channel at a time. Special accessories required to support multi-channel 30 A load switching at any one time.
(2) Exclusive of load

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Safety & CE Compliance

Safety	IEC 61010-1 (1990)+A2: 1995/EN61010-1 : 1993+A2 : 1995 CSA C22.2 #1010.1 (1992) UL 3111
EMC	CISPR 11: 1990/EN55011 1991: Group1, Class A EN50082-1: 1992 IEC 61000-4-2: 1995/: 4kV CD IEC 61000-4-3: 1995/: 3V/m IEC 61000-4-4: 1995/: 1kV power line

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