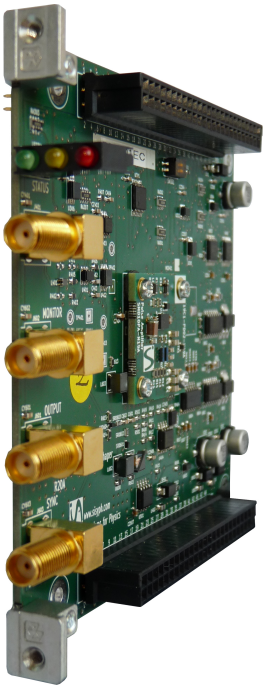
Datasheet

SMD10 *Aiguilhe* – Dual-Edge Pulse Sharpener

D-Series Modules – Subnanosecond Pulse Generator



FEATURES

- User controlled pulse edge sharpener
- Sub-nanosecond rise- and fall-time
- 300-ps pulse width
- High repetition rate (10 MHz)
- +5 V to + 30 V amplitude
- EMI noise immunity
- Ideal for rapid and reliable prototyping

APPLICATIONS

- Stroboscopic magnetic imaging TEM

Overview

The modules of the SMD-Series provide the experimentalists a complete line of instruments for the generation of short pulses at high repetition rates. First designed for stroboscopic magnetic imaging TEM (Transmission Electron Microscope), the SMD-Series offers a complete solution to deliver sub-nanosecond pulses into 50-Ω loads at repetition rates ranging from DC to 10 MHz.

The SMD10 *Aiguilhe* module mainly consists in a fixed-width pulse generator and a dual-edge pulse sharpener. The pulse generator, triggered *via* the input signal, delivers a high-voltage pulse to the edges-sharpener. This stage, consisting of two charge-controlled switches, allows the user to reduce both leading and trailing edges of the high-voltage pulse. The switching characteristics of the charge-controlled devices are adjusted through their bias currents using serial commands. The edges-sharpener output accessible on the front panel is also coupled to secondary outputs for synchronization and monitoring purposes.

Gathering other SMD-Series modules, the SR500 *Pulse Generator* is the ideal solution to generate high-voltage sub-nanosecond pulses at high repetition rate (10 MHz) for stroboscopic magnetic imaging TEM. With the additional SMZ320 *Serial Interface* module, the SR500 gives the user a complete control of the pulse generator over USB or optical interfaces.

Important Notice

Pulse Generator Specifications

Trigger Input	
Terminal	Front-panel SMA connector
Input resistance [a]	10 kΩ
Trigger level	TTL/5-V CMOS compatible
Range	0 V to +5 V
Repetition rate	DC to 10 MHz
Pulse width	10 ns min.
Pulse Output	
Terminal	Front-panel SMA connector
Series-resistance	5 Ω
Load resistance	50 Ω
Range	+5 V to +30 V peak
Propagation[b]	20 ns max.
Rise time	500 ps min.
Fall time	250 ps min.
Width	300 ps to 1000 ps
Pulse Monitor	
Terminal	Front-panel SMA connector
Load resistance	50 Ω
Coupling[c]	−20 dB (100 mV/V)
Pulse Synchro	
Terminal	Front-panel SMA connector
Load resistance	50 Ω
Coupling[c]	−20 dB (100 mV/V)

[a] 50-Ω AC-termination option is available.
[b] Measured from Trigger Input to Pulse Output.
[c] Measured from Pulse Output.

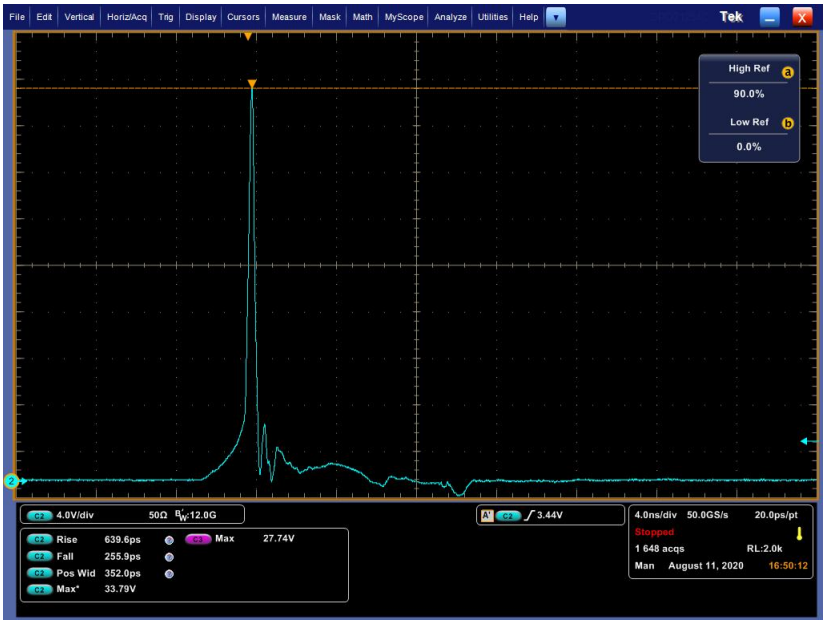


Figure 1: Output Pulse. Conditions: $f_{\mathrm{REP}} = 10\,\mathrm{MHz}$, $V_{\mathrm{REG}} = 30\,\mathrm{V}$, $I_{\mathrm{LE}} = 25\,\mathrm{mA}$ and $I_{\mathrm{TE}} = 7\,\mathrm{mA}$. Refer to *Typical Performance Curves* (online) for more information.

Digital Interface Specifications

Bias Current Control	
Terminal	50-pin stack-through connector
Interface	3-wire SPI
Range	0 mA to +30 mA
Resolution	8-bit digital potentiometer
Trip Point Control	
Terminal	50-pin stack-through connector
Interface	3-wire SPI
Range	0 mA to 500 mA
Resolution	8-bit digital potentiometer
Digital Inputs[b]	
Terminal	50-pin stack-through connector
Input resistance	100 kΩ (pull-up)
Trigger level	TTL/5-V CMOS compatible
Digital Outputs[a]	
Terminal	50-pin stack-through connector
Series resistance	1 kΩ
Load resistance	10 kΩ min.
Range	0 V to +5 V

[a] Specifications apply to `/TRIG`, `/OVLD`.
[b] Specifications apply to `/RESET`, `/ENABLE`, `MOSI`, `SCK`, `/SET_CS`, `/TRIP_CS`, `/LED_GB`, `/LED_YM`, `/LED_RT`.

Analog Interface Specifications

Bias Current Monitoring[a]

Terminal	50-pin stack-through connector
Range	0 V to +5 V
Sensitivity	100 mV/mA
Accuracy	±5 %
Offset	±100 µA max.

Temperature Monitoring

Terminal	50-pin stack-through connector
Sensor	2-lead NTC thermistor
$R_{25\,°C}$	10 kΩ (accuracy ±3 %)
β	3982 K from 25 °C to 85 °C (accuracy ±3 %)
Thermal resistance	TBD

Power Supply Input[b]

Terminal	50-pin stack-through connector
Range	+5 V to +30 V
Level abs. max.[d]	+30 V
Supply current	200 mA max[c].

[a] Applies to `ITE`, `ILE`.

[b] This DC input voltage (`POWER`) corresponds to the power supply of the pulse generator stage. The SMD20 module is designed to provide such a variable DC voltage ranging from +5 V to +30 V.

[c] Measured for $v_{max} = 30$ V at $f_{rep} = 10$ MHz.

[d] Stresses above these specifications may cause permanent damage.

General Specifications

This module is designed to be operated in laboratory environment.

Operating

Temperature	+15°C to +30°C

Power Requirements

+15 V	$I \leq 100$ mA
−15 V	$I \leq 100$ mA
+5 V	$I \leq 100$ mA
+24 V	Not used

Physical Properties

Height (component side)	17 mm max.
Weight	≤ 100 g
PCB	4-layer FR4, 100 mm × 100 mm

Warranty

One (1) year parts and labor on defects

Ordering Information

Front Panel Options	
SMD10-FP-xx	Shielded 3U-4HP front-panel
SMD10-NP-xx	none (standard)
Stack-through Header Options	
SMD10-xx-SC	50-pin header[a] (standard)
SMD10-xx-NC	none
Example of Ordering Code	
SMD10-NP-SC	standard

[a] Tyco Part Number: 1-173145-4.

Document Identifier

SMD10-SS01-R20A