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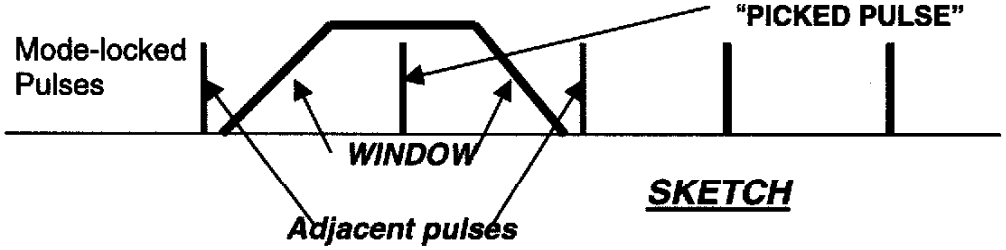
PULSE PICKERS
A SYSYTEM COMPARISON

Pockels cell system	Modulator system
High damage capability (GW rating)	Low damage capability (W rating)
Requires high voltage in NIR	Low voltage but limited in NIR
High transmission (~1% loss)	Fair transmission (~15% loss)
High price	Moderate price
Single or dual crystal	Dual or four crystals required
BBO limit ~2000nm	ADP limit 800nm,
KD*P limit 1064nm	Lithium Tantalate limit 4500nm
	KD*P and BBO are also available as a modulator but requires higher voltages
Rep-rate to ~50KHz (standard)	Rep-rate: ADP to 100MHz, 10MH with DD-1
	Lithium Niobate to >1GHz, TWAM/P or up to 10MHz with DD-1 with amplitude modulator
High contrast ratio >1000:1 typical	Medium contrast ratio ~ 500:1 with ADP
	Low contrast ratio ~ 100:1 with Lithium Tantalate

PULSE PICKER DRIVERS

When picking a pulse from a pulse train, the mode locked frequency must be addressed, since the "window" that picks a pulse must have enough time to open and close about a particular pulse as shown below.



SKETCH

The rise, fall and flat top area must fall between the adjacent pulses as shown in the sketch. The spacing or time duration between these adjacent pulses is dependent on the laser's mode-locked frequency. The table below is a guide to this spacing in nanoseconds. It is derived from the frequency of the mode-locked laser divided by two because the adjacent pulse have twice the distance as the normal un-picked pulses, and then inverted for the time duration.

MODE LOCKED FREQUENCY	***TOAL TIME BETWEEN ADJACENT* PULSES***	***T_r and T_f with 5 nsec pulse width (FWHM) Typical (each)***	***DRIVER*** *(Check rep-rate, this determines Pockels cell or Modulator)*
120MHz	**16.7 nsec**	**5.85nsec**	**EOM: 3100, 301-series PC: HVP-5-series, HVP-525D(M), HVP-5I-DIFF-series-*selected units***
110MHz	**18.2nsec**	**6.60nsec**	**EOM: 3100 PC: HVP-525D(M), HVP-5I-DIFF-series-*selected units***
100MHz	**20.0nsec**	**7.5nsec**	**EOM: 3100, 32180D, 3050 PC: HVP-525D(M)(S), HVP-5I-DIFF-series, HVP-590D(M) and -2, HVP-DPHT-2 HVP-590D-series**
90 MHz	**22.2nsec**	**8.6nsec**	"
85MHz	**23.5nsec**	**9.1nsec**	"
80MHz	**25.0nsec**	**10.0nsec**	"
75MHz	**26.7nsec**	**10.9nsec**	"
70MHz	**28.6nsec**	**11.8nsec**	"
65MHz	**30.8nsec**	**12.9nsec**	**HVP-540-DPHT, HVP-5-series,**
60MHz	**33.3nsec**	**14.2nsec**	**EOM: 3030 PC: HVP-4-250K,**

* See sketch

NOTES:

1) TWAM/P have their own drivers at 500MHz and 1 GHz.

2) More drivers are available for analog signals and Q switching.

3) In pulse slicing the rise/fall and pulse width are less than the pulse being sliced.

4) For shuttering a CW laser, the rise/fall and pulse are basically reflected in the optical representation of the electrical pulse.