



System and Channel Modes

Quantum Composers pulse generators have two levels of mode selection: system modes and channel modes. Combining these two modes together allows for complex pulse trains to be generated by one unit. Most Quantum Composers pulse generators contain both system and channel mode settings to provide the most comprehensive pulse generation solution available.

System modes are generated by the unit and then distributed to each of the individual channels. The available system modes are continuous, single shot, burst, and duty-cycle. Continuous mode generates a continuous stream of pulses that begin by pressing the run/stop button (or a trigger input) and end when the run/stop button is pressed a second time. Single shot mode will produce a single output pulse when the run/stop button is pressed (or the unit is triggered) and the system will automatically disarm itself when the pulse is over. Burst mode will generate a pre-determined number of pulses and then dis-arm the system when those pulses are completed. Duty-cycle produces a number of "on" pulses followed by a number of "off" pulses, where both the "on" and "off" pulses are set by the user. Figure 1 below shows a composite image of all of the available system modes.

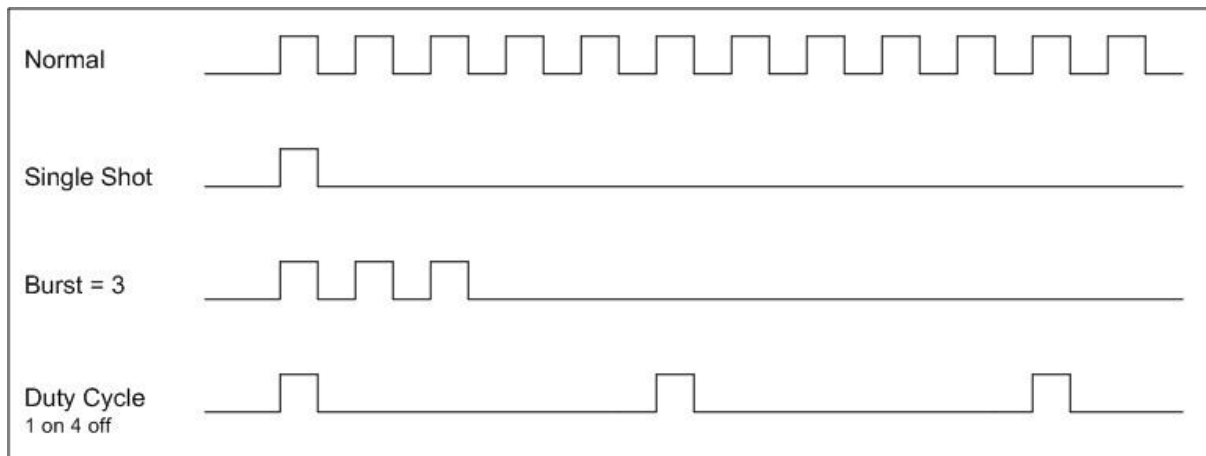


Figure 1

The channel modes are the same as the system modes with the exception of normal mode replacing continuous mode. With the channel in normal mode the output will be whatever the system is set to. One of the more significant changes at the channel level is that the channel will not re-arm itself. For example, with the system set to normal and channel A set to single shot only a single pulse will be output of Channel A even though the system is still armed and is actively generating pulses. The same behavior is exhibited when the channel mode is set to burst. Once the number of defined bursts is reached the output will no longer generate pulses even though the system is still armed and running. An easy way to think about the interaction between the two modes is to think of it as the system feeds the channel. Whatever the system is set to goes to all of the channels and the channels can then limit the output even further.

Figure 2 shows a pictorial representation of the system mode and its relationship to the channel modes. In this figure the channel mode limits the output.

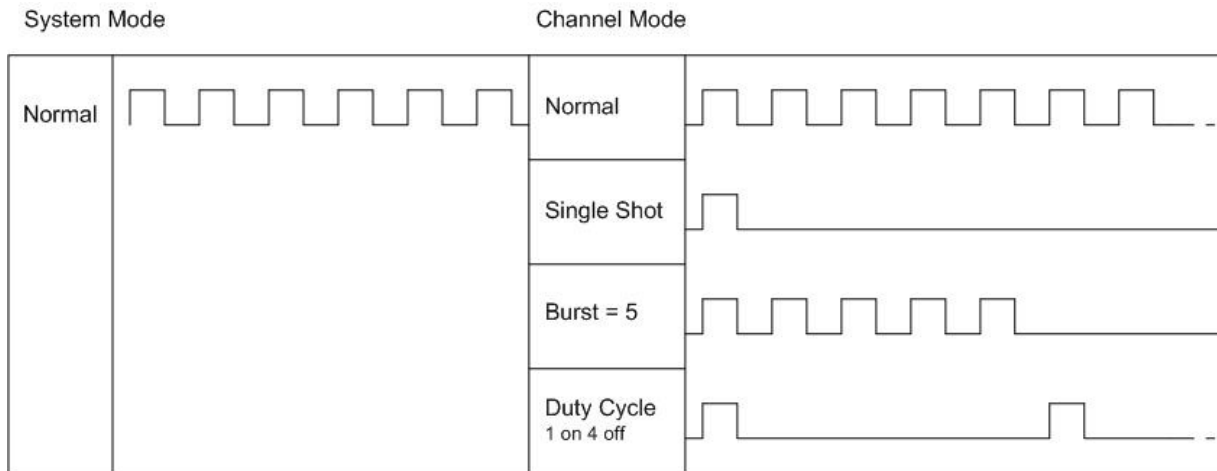


Figure 2

Figure 3 shows an example of where the system mode (Burst = 3) limits the output as compared to Figure 2.

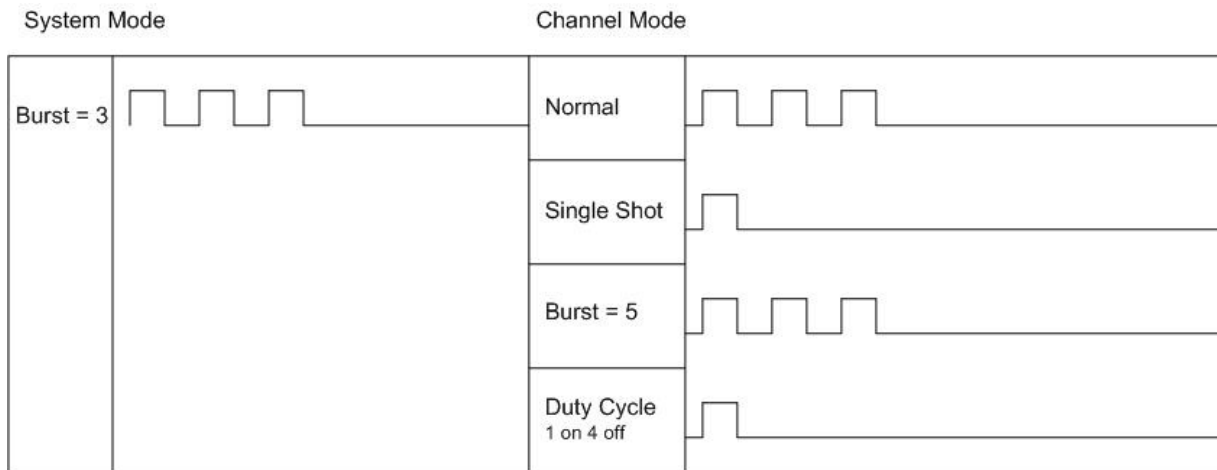


Figure 3

Notice that in figure 2, even though the channel burst mode is set to 5 only 3 pulses are output. A similar effect is seen if the channel mode was set to duty-cycle.

The output will be generated off of the more restrictive of the two modes. If the system mode is set to continuous and the channel mode is burst, only a burst of pulses will be generated, thus the output is limited by the channel mode. If the system mode is set to burst and the channel mode is normal only a burst will be generated but this time the output is limited by the system mode setting. While the output generated by the 2 examples above is the same (a burst of pulses) there are some minor differences.

In the first example where the system is set to continuous and the channel is set to burst the output set of pulses will only occur once but the system run indicator will continue to flash. (Note: the system run indicator is a flashing circle located in the upper left hand corner of the display) In this configuration, the channels can be re-armed by pressing the function (FUNC) button followed by the RUN/STOP button. With the system being set to continuous and the channel being the limiter, one channel could be left at normal and a second channel could be set to burst or single shot. This type of two stage architecture allows for the generation of complex pulse outputs that other pulse generators cannot achieve.

In the second example where the system is set to burst and the channel is set to normal the output set of pulses will occur once but this time the system run indicator will stop flashing. To re-enable the output for a second set of pulses the run/stop button must be pressed a second time. Once the second set of pulses is complete the system output will shut off again.

An application where this type of control is useful is the operation of a flash lamp pumped laser. With the system set to continuous, one channel can be set to normal (to control the flash lamp) and a second channel can be set to single shot (Q-switch control). The system period would be set to the desired frequency rate for the laser and the single shot channel will control the actual output of the laser. This allows the laser flash lamp to continue to run without actually firing the laser output. Independent channel delays can also be modified to optimize the laser's output performance.

When using channel modes it's important to note which modes will occur once and which ones will operate in a continuous fashion. The single shot mode and burst mode will occur once and the system will need to be re-armed (FUNC followed by RUN/STOP) before a second output can occur. The channel normal mode and duty-cycle modes will run continuously once the RUN/STOP button is pressed.

Only one channel mode can be set per output but all of the outputs are independent of one another so multiple channel modes can be set on one instrument. The channel independence and two stage modes allows for a large variety of outputs on a single unit.

Dual system and channel modes are just one of many unique and powerful features that the Quantum Composers pulse generators have to offer. If there are any questions about how any of our units operate or if there are special requirements for your project, please contact support@quantumcomposers.com and view our website at www.Quantumcomposers.com for our latest product offerings.