



## **WM8255 Extended Register Settings**

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### **INTRODUCTION**

The WM8255 and WM8255B are 16-bit analogue front end/digitiser IC's which include an RGB LED current drive using current slew rate controlled, current steering control and PWM functionality to control the operation of sensor LED's.

During a slew rate limited current switch of the LED IDAC, the change of current flowing in the IDAC can generate voltage spikes on the ILEDR/G/B pins that will couple a minor disturbance into the AFE. In colour mode this disturbance is not an issue since the state change switching will occur at the beginning of a line scan when no imaging is occurring. In mono mode a red, blue and green state switching may occur during a line scan and couple correlated switching noise into the signal path.

In both modes, a current spike can appear on the first PWM pulse after power up of the device.

This document details what steps must be taken to avoid the voltage spikes from occurring in both power up and operation, thereby preventing any disturbance in the AFE. The customer must use the settings detailed in this report.

### **EXECUTIVE SUMMARY**

The WM8255 and WM8255B can be set up to guarantee that the voltage spike issues will not occur during power up and operation by use of the register writes to the normal and extended page register map as detailed in this document and the datasheet of each device.

The register writes detailed to prevent the voltage spikes must be used in both mono and colour mode operation.

### **DEVICE SET-UP TO PREVENT VOLTAGE SPIKES**

#### **1) AFTER POWER UP**

To ensure that no voltage spike is seen in the LED IDAC on the first PWM pulse of after power-up of WM8255 or WM8255B, the following settings must be applied.

<b>DEVICE CONFIGURATION</b>		
<b>Address</b>	<b>Data</b>	<b>Comment</b>
0x01	0xA3	This will put the part into test configuration mode. Any address will now point to the extended page reconfiguration register
0x24	0x04	This will: - Configure the device so that no current spike will occur on first PWM pulse after power-up
0x01	0x23	This will take the part back into normal operating mode.

**Note:** If this COMPLETE SEQUENCE of operation is not carried out TOGETHER the part may go into an unsupported mode

**Table 1 – Device configuration**

## 2) IN OPERATION

To ensure that no voltage spikes are seen in the LED IDAC during operation of WM8255 or WM8255B, the following settings must be applied.

To minimise switching noise into the signal path:

- The blanking period must be disabled. In this mode during a state change, no slew rate limiting switching will occur, and only the RGB switches will be switched. Table 2 defines the method to disable blanking during a state transition.
- In this mode of operation, between states the absolute value of the LED IDAC current must not change.
- In this mode of operation, setting the duty cycle to zero is an invalid state. The RGB switches should be used to switch off the LED current.

BLANKING DISABLE CODE SET		
Address	Data	Comment
0x01	0xA3	This will put the part into test configuration mode. Any address will now point to the extended page reconfiguration register
0x24	0x1C	This will: - force the LED IDAC control state machine to stay on at all time - force the value to be held in LEDIDACR to be loaded into the LED current DAC
0x01	0x23	This will take the part back into normal operating mode.

**Note:** If this COMPLETE SEQUENCE of operation is not carried out TOGETHER the part may go into an unsupported mode

**Table 2 – Blanking Period Disable**

To finish a mono mode scan with blanking period disabled and perform another operation, the part needs to get into a know state. Two options are available for a complete reset of the device or a reset of the LED sequence controller, as shown in Table 3 below.

OPTION 1: WM8255 GLOBAL RESET FROM BLANKING PERIOD DISABLE		
Address	Data	Comment
0x04	0x00	This will reset the WM8255 into its default condition. The part should now be fully reconfigured into the user configuration.
OPTION 2: WM8255 LED SEQUENCE CONTROLLER RESET FROM BLANKING PERIOD DISABLE		
Address	Data	Comment
0x2F	0x00	This will reset LED sequence controller WM8255. All configuration data will be held.

**Table 3 – Reset options after blanking period disabled mono-mode scan**

## WM8255 PWM LIMITATION

For correct operation during PWM mode, the following limitations must be followed to ensure correct operation.

- 1) Use extended page register(0x24) to keep IDAC current stable, as detailed in Table 2
- 2)  $LEDPWMDCR [11:0] < (LEDPWMPER [11:0] - (INITBLANK [8:0]/4) - 1)$
- 3)  $LEDPWMDCG [11:0] < (LEDPWMPER [11:0] - (INITBLANK [8:0]/4) - 1)$
- 4)  $LEDPWMDCB [11:0] < (LEDPWMPER [11:0] - (INITBLANK [8:0]/4) - 1)$

Definition of terms:

*LEDPWMPWR:* This is register name symbol on the datasheet. This register defines PWM duty cycle.

*LEDPWMDCR/LEDPWMDCG/LEDPWMDCB:* These are register name symbols on the datasheet. This register defines LED's duty cycle while it can turn on LED.

*INITBLANK: This is register name symbol on the datasheet. This register defines initial blanking period. WM8255 has only 6bit register for INITBLANK. This means WM8255's register have only INITBLANK [8:3]. INITBLANK [2:0] is '000b' always.*

#### **DUTY CYCLE LIMITATION**

There is possibility that current switching noise can also occur when the LEDPWMDx is set to zero. The customer must use the extended page register(0x24) to keep IDAC current stable as detailed in Table 2 if the LEDPWMDx is set to zero and the device is set up in a manner in which current switching noise will cause an issue.

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