

/ how to debug kernel driver

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- [Dynamic Debug](#)
- [sysfs](#)
- [regmap](#)
- <https://kernelnewbies.org/FAQ/LinuxKernelDebug101>
- https://elinux.org/Kernel_Debugging_Tips
- https://elinux.org/Debugging_by_printing
- <https://training.ti.com/debugging-embedded-linux-systems-training-series>

dev_dbg	include/linux/printk.h CONFIG_DYNAMIC_DEBUG print
pr_debug	c define DEBUGprint
dev_info	printk
dev_err	
dev_warn	

printk

1. kerneldebug level cat /proc/sys/kernel/printk 4
 - a. echo 8 > /proc/sys/kernel/printk
 - b. BSP7
2.
 - a. return
3. logdmesgconsole
 - a. loglevel=8

Dynamic Debug

CONFIG_DEBUG_FS CONFIG_DYNAMIC_DEBUG

<https://www.kernel.org/doc/html/latest/admin-guide/dynamic-debug-howto.html>

<https://lwn.net/Articles/434833/>

```
dev_dbg(&client->dev, "probing for EDT FT5x06 I2C\n");
```

- pr_debug()
- dev_dbg()

-
-
-
-
-

dynamic_debug CONFIG_DYNAMIC_DEBUG

```

root@phycore-am335x-1:~# cat /sys/kernel/debug/dynamic_debug/control | grep edt
drivers/input/touchscreen/edt-ft5x06.c:662 [edt_ft5x06]edt_ft5x06_debugfs_raw_data_read =_ "failed to write
0x08 register, error %d\012"
drivers/input/touchscreen/edt-ft5x06.c:676 [edt_ft5x06]edt_ft5x06_debugfs_raw_data_read =_ "failed to read 0x08
register, error %d\012"
drivers/input/touchscreen/edt-ft5x06.c:682 [edt_ft5x06]edt_ft5x06_debugfs_raw_data_read =_ "timed out waiting
for register to settle\012"
drivers/input/touchscreen/edt-ft5x06.c:895 [edt_ft5x06]edt_ft5x06_ts_probe =_ "probing for EDT FT5x06 I2C\012"
drivers/input/touchscreen/edt-ft5x06.c:965 [edt_ft5x06]edt_ft5x06_ts_probe =_ "Model \042%s\042, Rev. \042%
s\042, %dx%d sensors\012"
drivers/input/touchscreen/edt-ft5x06.c:1016 [edt_ft5x06]edt_ft5x06_ts_probe =_ "EDT FT5x06 initialized: IRQ %d,
WAKE pin %d, Reset pin %d.\012"

```

- bootloader
 - barebox:
 - [barebox-](#)
 - nv linux.bootargs.debug='dyndbg="file edt-ft5x06.c +p"'
 - loglevelnv linux.bootargs.debug='dyndbg="file wm8962.c +p; file imx-wm8962.c +p" loglevel=8'
 - uboot:
 - setenv mmcargs setenv 'bootargs console=\${console},\${baudrate} root=\${mmccroot} dyndbg=""file mxsfbsii902x.c +p""
 - dev_dbg
- debugsys
 - echo "func omap_i2c_xfer_msg +p" > /sys/kernel/debug/dynamic_debug/control
-

```

cat /sys/kernel/debug/dynamic_debug/control | grep keyword
before:
drivers/i2c/busses/i2c-imx.c:896 [i2c_imx]i2c_imx_xfer =_ "<%s>\012"
after:
drivers/i2c/busses/i2c-imx.c:896 [i2c_imx]i2c_imx_xfer =p "<%s>\012"

```

"=_ " =p"

```

root@phycore-am335x-1:~# dmesg | grep edt
[ 1.765709] ledtrig-cpu: registered to indicate activity on CPUs
[ 2.365390] bus: 'i2c': driver_probe_device: matched device 0-0038 with driver edt_ft5x06
[ 2.365402] bus: 'i2c': really_probe: probing driver edt_ft5x06 with device 0-0038
[ 2.365550] edt_ft5x06 0-0038: no init pinctrl state
[ 2.365576] edt_ft5x06 0-0038: no sleep pinctrl state
[ 2.365585] edt_ft5x06 0-0038: no idle pinctrl state
[ 2.365697] edt_ft5x06 0-0038: probing for EDT FT5x06 I2C
[ 2.365721] edt_ft5x06 0-0038: GPIO lookup for consumer reset
[ 2.365730] edt_ft5x06 0-0038: using device tree for GPIO lookup
[ 2.365766] edt_ft5x06 0-0038: using lookup tables for GPIO lookup
[ 2.365777] edt_ft5x06 0-0038: lookup for GPIO reset failed
[ 2.365791] edt_ft5x06 0-0038: GPIO lookup for consumer wake
[ 2.365799] edt_ft5x06 0-0038: using device tree for GPIO lookup
[ 2.365827] edt_ft5x06 0-0038: using lookup tables for GPIO lookup
[ 2.365836] edt_ft5x06 0-0038: lookup for GPIO wake failed
[ 2.367843] edt_ft5x06 0-0038: Model "EP0700M06", Rev. "A1G_120307", 28x16 sensors
[ 2.378482] edt_ft5x06 0-0038: EDT FT5x06 initialized: IRQ 47, WAKE pin -1, Reset pin -1.
[ 2.378495] driver: 'edt_ft5x06': driver_bound: bound to device '0-0038'
[ 2.378512] bus: 'i2c': really_probe: bound device 0-0038 to driver edt_ft5x06

```

```

root@phycore-am335x-1:~# cat /proc/kmsg
<7>[ 795.166538] omap_i2c 44e0b000.i2c: addr: 0x0038, len: 1, flags: 0x0, stop: 0
<7>[ 795.166734] omap_i2c 44e0b000.i2c: addr: 0x0038, len: 26, flags: 0x1, stop: 1
<7>[ 795.179665] omap_i2c 44e0b000.i2c: addr: 0x0038, len: 1, flags: 0x0, stop: 0
<7>[ 795.179865] omap_i2c 44e0b000.i2c: addr: 0x0038, len: 26, flags: 0x1, stop: 1

```

debug

```

root@phyboard-segin-imx6ul-2:~# cat /sys/kernel/debug/dynamic_debug/control | grep i2c-imx
...
drivers/i2c/busses/i2c-imx.c:883 [i2c_imx]i2c_imx_read =p "<%s> read byte: B%d=0x%X\012"
...
drivers/i2c/busses/i2c-imx.c:773 [i2c_imx]i2c_imx_write =p "<%s> write byte: B%d=0x%X\012"

```

```

echo 'file i2c-imx.c line 883 +p' > /sys/kernel/debug/dynamic_debug/control
echo 'file i2c-imx.c line 773 +p' > /sys/kernel/debug/dynamic_debug/control

```

```

[ 4710.017684] i2c i2c-0: <i2c_imx_write> write byte: B0=0xFC
[ 4710.018262] i2c i2c-0: <i2c_imx_read> read byte: B0=0x0
[ 4710.018399] i2c i2c-0: <i2c_imx_read> read byte: B1=0x0
[ 4710.018570] i2c i2c-0: <i2c_imx_read> read byte: B2=0x82
[ 4710.018757] i2c i2c-0: <i2c_imx_read> read byte: B3=0xB4

```

1. tag =p
2. /i2ci2c

sysfs

sysfs

- <https://www.kernel.org/doc/Documentation/filesystems/sysfs.txt>

i2c	/sys/bus/i2c/drivers
i2c	/sys/bus/i2c/devices
	/sys/firmware/devicetree/base
regulator	/sys/kernel/debug/regulator
gpio	/sys/kernel/debug/gpio
mmc(0)	/sys/kernel/debug/mmc#/ios
	/proc/interrupts
	/sys/kernel/debug/clk/clk_summary
pin muxpad	/sys/kernel/debug/pinctrl/
sdio	/sys/kernel/debug/mmc1/ios

regmap

regmap_i2c/spi

/sys/bus/i2c/devices

```
root@ceyear-imx6ul-2:/sys/bus/i2c/devices# ls
0-0040 0-0052 0-0068 1-0018 3-0038 i2c-0 i2c-1 i2c-3
```

0-0040i2c00x401-0018

drivers/base/regmap/regmap.c

```
diff --git a/drivers/base/regmap/regmap.c b/drivers/base/regmap/regmap.c
index 8fd0802..aa285ec 100644
--- a/drivers/base/regmap/regmap.c
+++ b/drivers/base/regmap/regmap.c
@@ -32,7 +32,7 @@
 * sort of problem defining LOG_DEVICE will add printks for basic
 * register I/O on a specific device.
 */
-#undef LOG_DEVICE
+#define LOG_DEVICE "1-0018"

static int _regmap_update_bits(struct regmap *map, unsigned int reg,
                             unsigned int mask, unsigned int val,
```

regmap1-0018<==>

```
root@ceyear-imx6ul-2:~# dmesg | grep tlv
[ 1.765334] tlv320aic3x-codec 1-0018: 0 <= d
[ 1.770517] tlv320aic3x-codec 1-0018: d <= d
[ 1.775402] tlv320aic3x-codec 1-0018: 8 <= 5c
[ 1.780494] tlv320aic3x-codec 1-0018: 8 <= 5d
[ 1.785572] tlv320aic3x-codec 1-0018: 8 <= 5c
[ 1.790657] tlv320aic3x-codec 1-0018: 0 <= 0
```