

STRUCTURE	Silicon Monolithic IC
PRODUCT NAME	Main power supply for TFT-LCD panel module
TYPE	BD8154EFV
FEATURES	Boost and Buck converter Built-in Charge pump driver 2.5V Regulator controller

● ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	LIMITS	UNIT
Supply voltage	VCC, PVCC, VCP	19	V
SW voltage	V _{SW1} , V _{SW2} , V _{BOOT}	19	V
SW current	I _{SW}	2.0 ^{*2}	A
Power dissipation	Pd	1600 ^{*1}	mW
Operating temperature range	T _{OPR}	-40 ~ 85	°C
Storage temperature range	T _{STG}	-55 ~ 150	°C
Junction temperature	T _{JMAX}	150	°C

^{*1} Derated at 8.8mW/°C for temperatures above Ta=25°C, mounted on 70x70x1.6mm Glass-epoxy PCB.

^{*2} Pd and A.S.O. should not be exceeded.

● OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN	MAX	UNIT
Supply voltage	VCC, PVCC, VCP	6	18	V
Boost voltage	V _{UP}	VCC+2	18	V
Buck voltage	V _{DWN}	3.0	3.6	V
Positive Charge pump voltage	VGH	VCP	38	V
SW Current	I _{SW}	-	2	A
RT resistor	RT	18	180	kΩ

NOTE: The product described in this specification is a strategic product (and/or service) subject to COCOM regulations. It should not be exported without authorization from the appropriate government.

Status of this document

The English version of this document is the formal specification.

A customer may use this translation version only for a reference to help reading the formal version.

If there are any differences in translation version of this document, formal version takes priority.

● Electrical characteristics (unless otherwise specified VCC=12V and Ta=25°C)

1. DC/DC converter controller block

PARAMETER	SYMBOL	LIMITS			UNIT	CONDITIONS
		MIN	TYP	MAX		
Soft start – SS1 and SS2						
SS source current	I _{SO}	6	10	14	μA	V _{SS} =0.5V
Error amplifier block – FB1 and FB2						
FB input bias current	I _{FB12}	0	0.5	2	μA	
Feedback voltage	V _{FB12}	1.231	1.250	1.269	V	Voltage follower
SW block – SW1						
On resistance N-channel	R _{ONN}	-	200	600	mΩ	I _O =0.8A* ¹
Leak current N-channel	I _{LEAKN1}	-	0	10	μA	V _{SW1} =18V
Maximum duty cycle	D _{MAX}	75	85	95	%	* ¹
SW block – SW2						
High side On resistance	R _{ONH}	-	200	600	mΩ	I _O =0.8A* ¹
Leak current N-channel	I _{LEAKN2}	-	0	10	μA	V _{SW2} =0V, PVCC=18V
Over current protection						
Switch current limit	I _{NSW}	2.0	-	-	A	* ¹

*¹ Guaranteed by design. Final test is not done on all products.

2. Charge pump driver block

PARAMETER	SYMBOL	LIMITS			UNIT	CONDITIONS
		MIN	TYP	MAX		
Error amplifier block – FB3 and FB4						
FB input bias current	I _{FB34}	0	0.1	1.0	μA	
Feedback voltage for VGH-FB3	V _{FB3}	1.199	1.290	1.381	V	
Feedback voltage for VGL-FB4	V _{FB4}	1.207	1.270	1.344	V	
Delay start block – SS3 and SS4						
DLS source current	I _{DSO}	3	5	9	μA	V _{DLS} =0.5V
Start up voltage	V _{ST}	0.50	0.65	0.80	V	
SW block – C1L, C2L and C3						
On resistance N-channel	R _{ONNC2}	-	2	4	Ω	I _O =20mA* ¹
On resistance P-channel	R _{ONP2}	-	2	4	Ω	I _O =20mA* ¹
Diode – C1H, C2H and VGH						
Forward voltage	V _F	600	750	900	mV	I _O =10mA

3. Regulator controller

PARAMETER	SYMBOL	LIMITS			UNIT	CONDITIONS
		MIN	TYP	MAX		
Error amplifier block – BASE and FB5						
Feedback voltage	V _{FB5}	2.40	2.50	2.60	V	
FB sink current	I _{FB5}	13	24	35	μA	
Maximum base current	I _{BMAX}	3	10	20	mA	
Load regulation	R _{GLOAD}	0	10	50	mV	
Under voltage lock out block						
Off threshold voltage	V _{ROFF}	5.0	5.5	6.0	V	VCC rising
On threshold voltage	V _{RON}	4.5	5.0	5.5	V	VCC falling

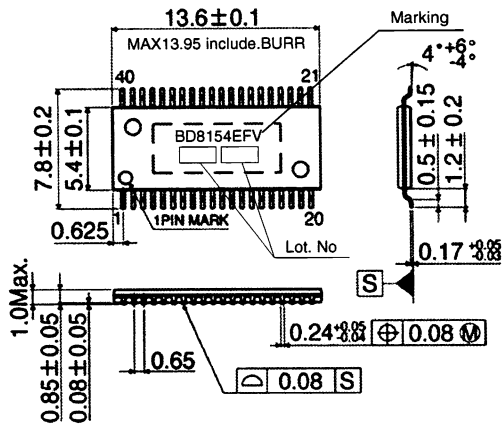
4. General

PARAMETER	SYMBOL	LIMITS			UNIT	CONDITIONS
		MIN	TYP	MAX		
Supply current						
Average supply current	I _{CC}	1	4	10	mA	No switching
Oscillator						
Oscillation frequency	F _{OSC}	0.96	1.20	1.44	MHz	RT=24kΩ

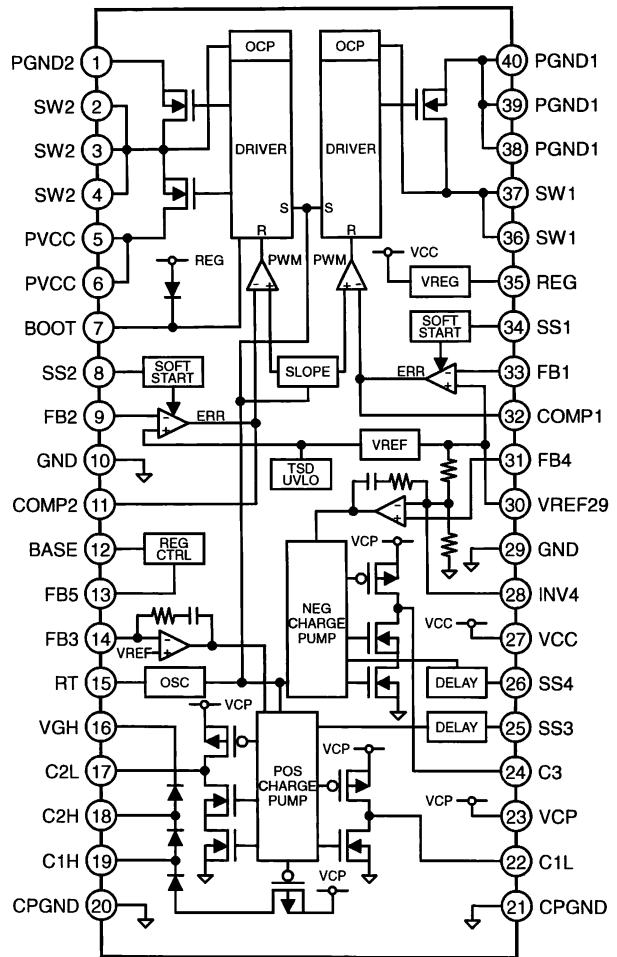
* This product is not designed for protection against radioactive rays.

*¹ Guaranteed by design. Final test is not done on all products.

● PHYSICAL DIMENSIONS-MARKING (HTSSOP-B40)



● BLOCK DIAGRAM



*Please refer to Technical note concerning application circuit, and etc.

● PIN DESCRIPTION

Pin No.	Name	Function	Pin No.	Name	Function
1	PGND2	Power ground	21	CPGND	Power ground
2	SW2	Power switch (down converter)	22	C1L	Negative term. of C.P. flying capacitor
3	SW2		23	VCP	Power supply for charge pump
4	SW2		24	C3	Negative charge pump driver
5	PVCC		Power supply	25	SS3
6	PVCC	26		SS4	Delay start current output of neg.C.P.
7	BOOT	Boot strap terminal	27	VCC	Power supply
8	SS2	Soft start current output of down conv.	28	INV4	Inverted feedback input of neg.C.P.
9	FB2	Feedback input of down conv.	29	GND	Ground
10	GND	Ground	30	VREF29	Internal regulator output
11	COMP2	Error amplifier output of down conv.	31	FB4	Feedback input of negative C.P.
12	BASE	Base drive output for LDO	32	COMP1	Error amplifier output of up conv.
13	FB5	Feedback input of LDO	33	FB1	Feedback input of up conv.
14	FB3	Feedback input of positive C.P.	34	SS1	Soft start current output of up conv.
15	RT	Frequency adjust	35	REG	Internal regulator output
16	VGH	Positive charge pump output	36	SW1	Power switch (up converter)
17	C2L	Negative term. of C.P. flying capacitor	37	SW1	
18	C2H	Positive term. of C.P. flying capacitor	38	PGND1	Power ground
19	C1H	Positive term. of C.P. flying capacitor	39	PGND1	
20	CPGND	Power ground	40	PGND1	

● PRECAUTION FOR USE

1. Operation supply voltage
The circuit functionality is guaranteed within operation of ambient temperature range, as long as it is within operation supply voltage range. The standard electrical characteristic values are guaranteed at the test circuit voltage of VCC=12V. They cannot be guaranteed at other voltages in the operating range of 6~18V. However, the variation will be small.
2. Power dissipation
Refer to the thermal reduction characteristics shown in the technical note. Also, be sure to use this IC within a power dissipation range allowing enough margins.
3. Grounding
It is recommended that each capacitor (bypass and another capacitors) is grounded using single-point connection.
4. COMP terminal
COMP terminal is for phase margin of the DC/DC system. A capacitor and a resistor or an only capacitor placed between COMP terminal. The values of the capacitor and the resistor shall be adjusted according to the output current and the output capacitor value. The output may be oscillating if the value of capacitor is not sufficient, also the transient response may become insufficient if the value is too large. Therefore, the value of the capacitor and the resistor shall be adequately set up based on the condition of the temperature, and so on.
5. VCC terminal
For reduce the influence of switching noise, bypass capacitor is connected between VCC and GND.
6. Positive charge pump 2x-mode and 3x-mode
According to the output voltage of VGH, the charge pump 2x-mode or 3x-mode have to be decided. When the feedback resistors are disconnected under the 3x-mode, there are destructive possibilities for charge pump. So the external power zener diode should be added to VGH terminal.
7. Induced surge voltage at SW1
There are possibilities that SW1 pin is destroyed because of the surge induced by inductor when VCC start up at 0.2V/ μ s or more. In this case, please consider using power zener diode at SW1 pin.
8. Feedback resistors at step-up DC/DC block
In this case that FB1 pin is shorted to GND or open. There are possibilities that the destruction of IC occurs. Please make sure that feedback resistors are connected to FB1 pin.
9. Pin to pin short circuit
Shorting any pin to other pins or to VCC, GND or any high voltage pins may cause malfunctions or destructions of IC or the external parts. Please make sure that pin to pin short circuit does not occur.
10. Electromagnetic fields
The IC is susceptible to strong electromagnetic fields and may cause malfunction. Therefore, caution should be used when placing it on the PCB.
11. Miscellaneous
This product is produced with strict quality control, but can be destroyed if used beyond absolute maximum ratings. Furthermore, the failure mode cannot be defined (e.g. short mode or open mode), if the device is used above the absolute maximum ratings, a fuse is recommended.
12. Application design
When designing the external circuit, included adequate margins, including not only steady state but also transient characteristics.

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