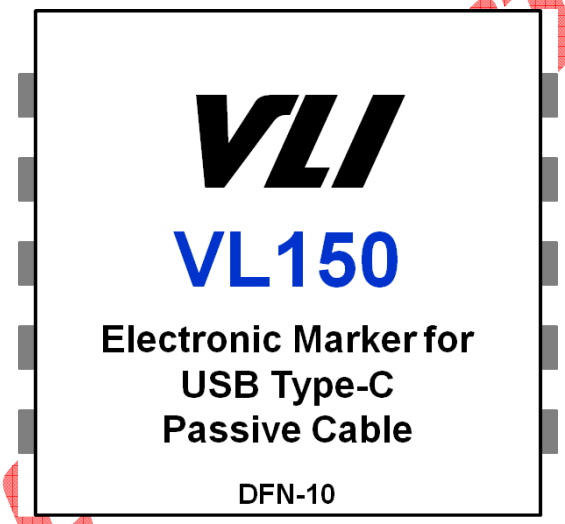
VIA Labs, Inc.

Data Sheet

VL150
E-Marker for USB Type-C Cables

December 5th, 2014
Revision 0.60



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Revision History

Rev	Date	Initial	Note
0.60	12/5/2014	TS	Preliminary Release

VL150 System Overview

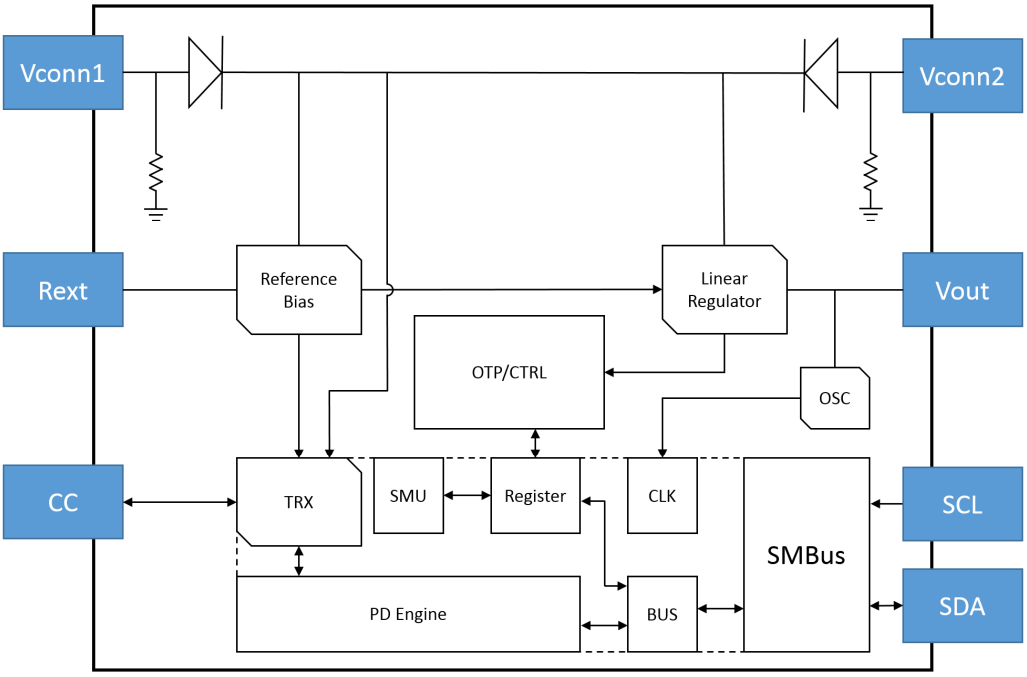


Figure 1 – VL150 Block Diagram

Product Features

VL150
Electronic Marker for USB Type-C Passive Cables

PD 2.0 Compliant
- Compliant to USB Power Delivery 2.0 Specification
- SOP' Endpoint
- Supports Programming over CC Line using Structured Vendor Defined Messages

Sideband Signal Support
- Supports SMbus for Programming and Debugging

Easy Manufacturability
- DFN-10 3x3mm features 0.5mm pin pitch for easy manufacturing and can use standard PCB
- VL150 has a default profile prior to programming
- OTP Programming Support over CC or SMBus
- Extremely Low BOM Cost: Diodes, Ra are all integrated On-Die

OTP Memory Onboard
- Supports One-Time Writable memory to store Cable VDO, Certificatin Status VDO, Product VDO, etc.
- OTP features write-protection support so finished cables cannot be modified

Applications
- Passive USB Type-C Cables such as Full-Featured C-to-C cables.
- This IC is not intended for use in combo PD 1.0 and PD 2.0 applications

Platform and Operating System Support
- General support across all major OS and platforms that offer USB such as PC, MAC, Linux, etc.
- FW Update over USB
- USB hub function is dependent upon the USB Host Controller
- No proprietary driver needed, even for Battery Charging Function

Misc
- Optimized for Low Power consumption

Pinout

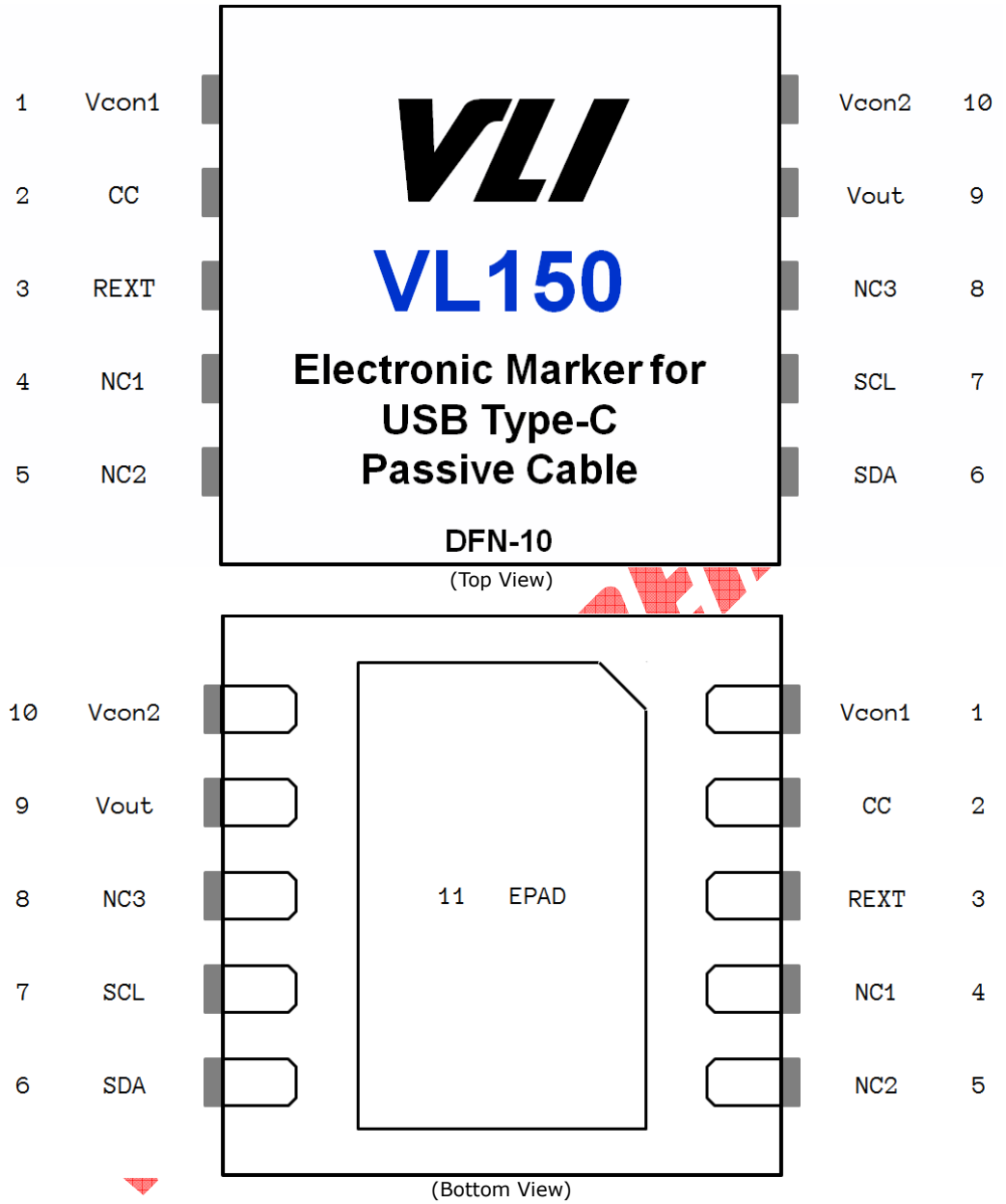


Figure 2 – VL150 Pin Diagram (DFN-10)

Pin List

Pin	Pin Name	Pin	Pin Name
1	Vcon1	6	SDA
2	CC	7	SCL
3	REXT	8	NC3
4	NC1	9	Vout
5	NC2	10	Vcon2
		11	EPAD

Pin Descriptions

Signal Type Definition

Name	Type	Signal Description
Input	I	A logic input-only signal
Output	O	A logic output only signal
Input/Output	I/O	A logic bi-directional signal
Power	PWR	A power pin
Ground	GND	A ground pin

Type-C Interface

Pin Name	Pin #	I/O	Signal Description
Vcon1	1	PWR	Vconn Power (Near Side)
CC	2	I/O	CC communication line
Vcon2	10	PWR	Vconn Power (Far Side)

Sideband & Miscellaneous

Pin Name	Pin #	I/O	Signal Description
SCL	24	I	SMBus Clock (Open Drain)
SDA	23	I/O	SMBus Data (Open Drain)
NC1	27		Not Connected (Float)
NC2	26		Not Connected (Float)
NC3	25		Not Connected (Float)

Power & Ground

Pin Name	Pin #	I/O	Signal Description
REXT	3	O	External Reference Resistor (120K 1%)
Vout	9	PWR	Connect to 1uF X5R Capacitor
EPAD	11	GND	Exposed Pad; System Ground

Electrical Specification

Absolute Maximum Rating

Symbol	Parameter	Min	Max	Unit	Note
T_{STG}	Storage Temperature	-55	125	°C	—
$V_{CON1/2}$	Vconn	-0.5	7	V	—
V_{ESD}	Electrostatic Discharge	-2000	2000	V	Human Body Model
θ_{jc}	Thermal resistance between junction and case	● TBD		°C/W	2L & 4L PCB definitions follow JESD51-7
P_D	Max Power Dissipation	—	TBD	W	

Note: Stress above conditions may cause permanent damage to the device. Functional operation of this device should be restricted to the conditions described.

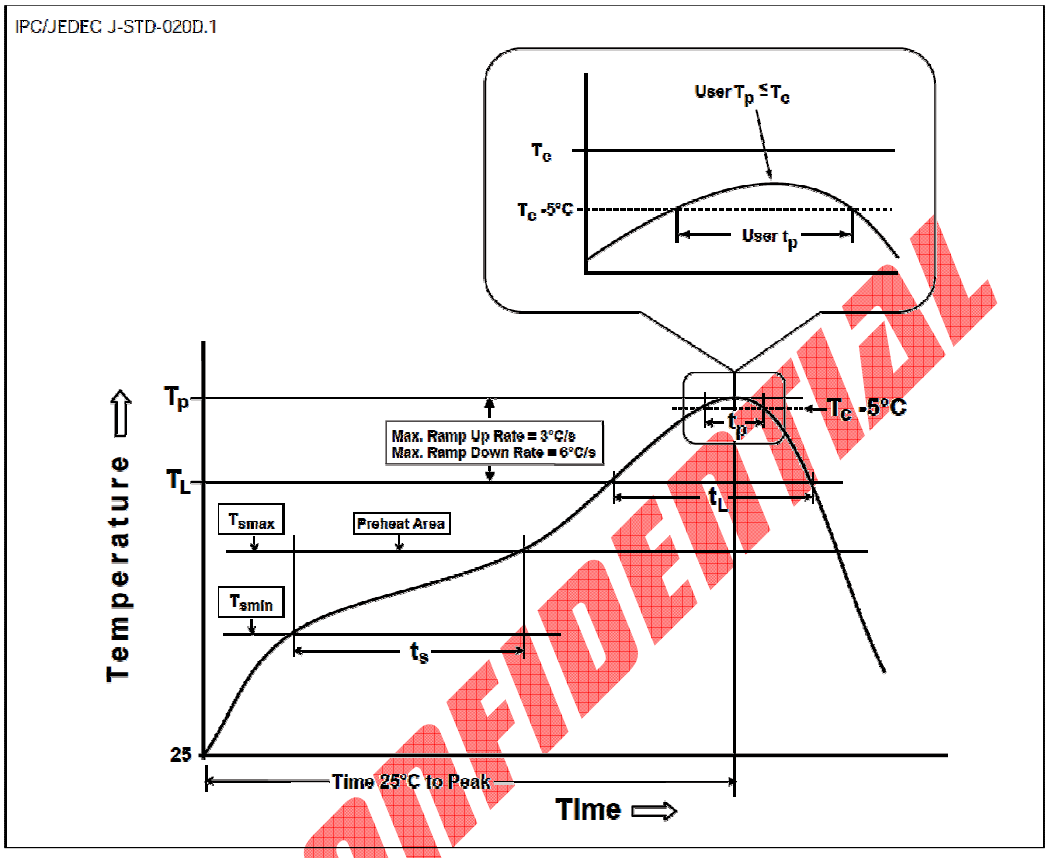
Note: About thermal factors, T_a is the concerned ambient temperature, and
$\theta_{ca} = \theta_{ja} - \theta_{jc}$
$T_J = \theta_{ja} * P_D + T_a$
$T_c = \theta_{ca} * P_D + T_a$

Operating Conditions

Symbol	Parameter	Min	Max	Unit	Note
T_A	Ambient Temperature	-25	85	°C	TBD
T_j	Junction Temperature	0	125	°C	—
$V_{CON1/2}$	Vconn	4	5.5	V	—

Power Consumption:
Operation: <70mW
Suspend: <7.5mA

General Reflow Profile Guidelines.

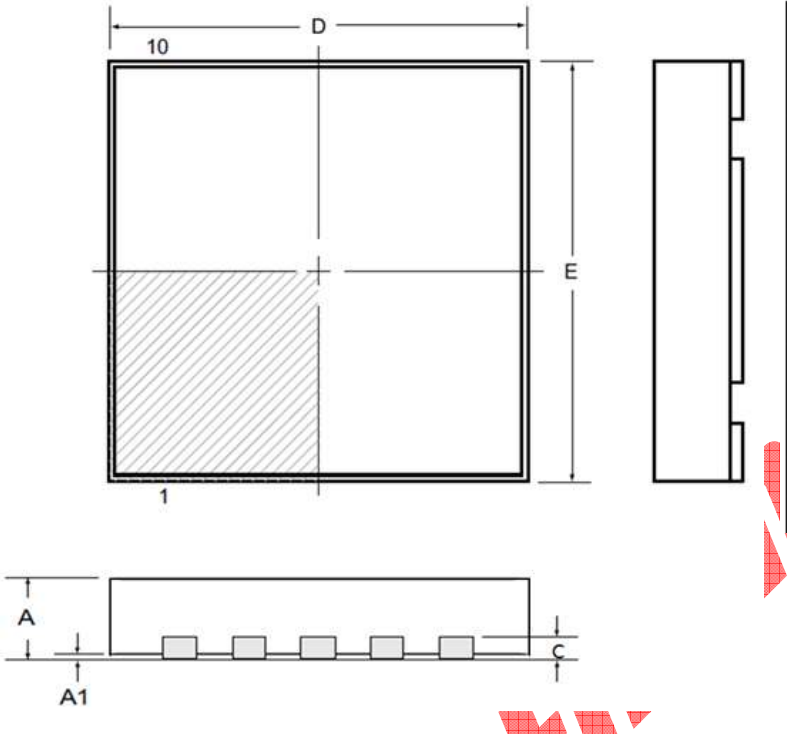


Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat/Soak Temperature Min (T_{smin}) Temperature Max (T_{smax}) Time (t_s) from (T_{smin} to T_{smax})	 100 °C 150 °C 60-120 seconds	 150 °C 200 °C 60-120 seconds
Ramp-up rate (T_L to T_p)	3 °C/second max.	3 °C/second max.
Liquidous temperature (T_L) Time (t_L) maintained above T_L	183 °C 60-150 seconds	217 °C 60-150 seconds
Peak package body temperature (T_p)	225 °C	250 °C
Classification temperature (T_c)	230 °C	255 °C
Time (t_p)* within 5 °C of the specified classification temperature (T_c)	20* seconds	30* seconds
Ramp-down rate (T_p to T_L)	6 °C/second max.	6 °C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

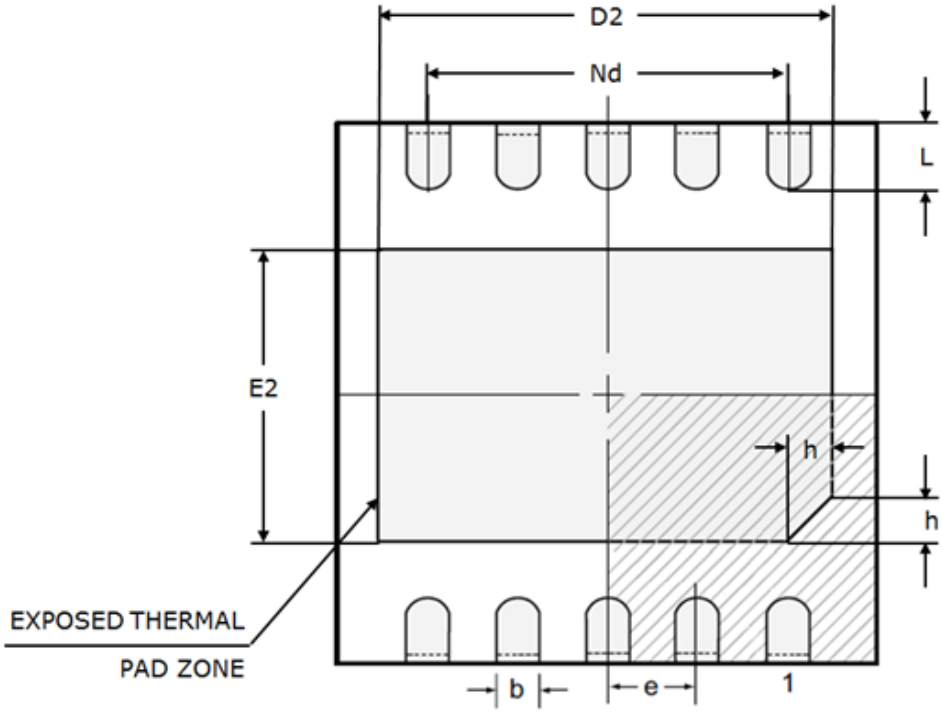
Note 1: All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow (e.g., live-bug).

Figure 6 –Reflow

Package Mechanical Specifications (DFN-10)

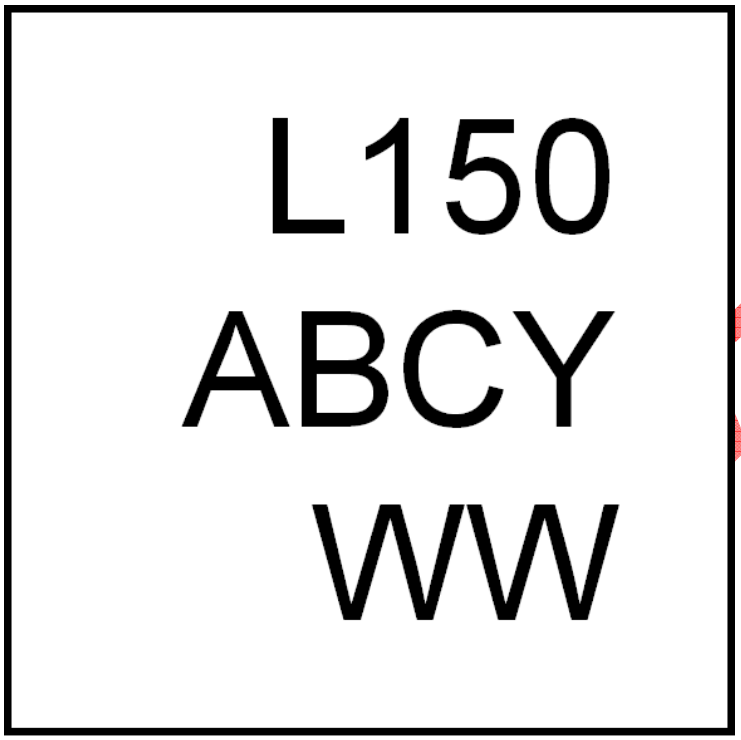


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	-	0.02	0.05
b	0.18	0.25	0.30
c	0.18	0.20	0.25
D	2.90	3.00	3.10
D2	2.40	2.50	2.60
e	0.50BSC		
Nd	2.00BSC		
E	2.90	3.00	3.10
E2	1.45	1.55	1.65
L	0.30	0.40	0.50
h	0.20	0.25	0.30



BOTTOM VIEW

Package Top Side Marking & Ordering Information



L150: Product Name
ABC: Wafer Lot Serial Number
Y: Year Code
WW: Week Number

Ordering Information	Description	Package Type
VL150-D1	VL150 Tape and Reel (3K)	DFN10 3x3 mm

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