SLG55587
SLG55587A
USB Host Charger Identification Analog Switches

General Description

The SLG55587/SLG55587A is a USB device that combines high speed USB switches with a USB host charger (dedicated charger) identification circuit. The device supports both the latest USB Battery Charging Specification Revision 1.2 including data contact detection and a set resistor bias for Apple compliant devices as well as legacy USB D+/D- short detection using data line pull-up.

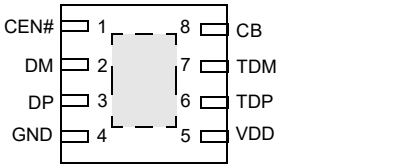
The SLG55587/SLG55587A can also support Apple IPAD2 @ 2 A charging current.

The SLG55587/SLG55587A can also support low speed / full speed mouse/keyboard wake-up from S3 mode.

Features

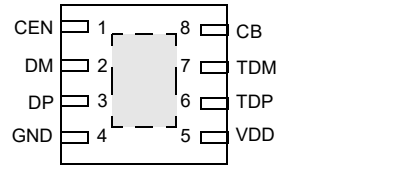
- High Speed USB Switching
- Low 4.0 pF (typ) On Capacitance
- Low 4.0 Ω (typ) On Resistance
- Low 0.5 Ω (typ) On Resistance Flatness
- 4.5 V to 5.5 V Supply Range
- Low Supply Current
- Automatic Current-Limit Switch Control
- Automatic USB Charger Identification Circuit
- Apple IPAD2 @ 2 A charging current support
- Pb-Free / RoHS Compliant
- Halogen-Free
- TDFN-8 Package

Pin Configuration - SLG55587



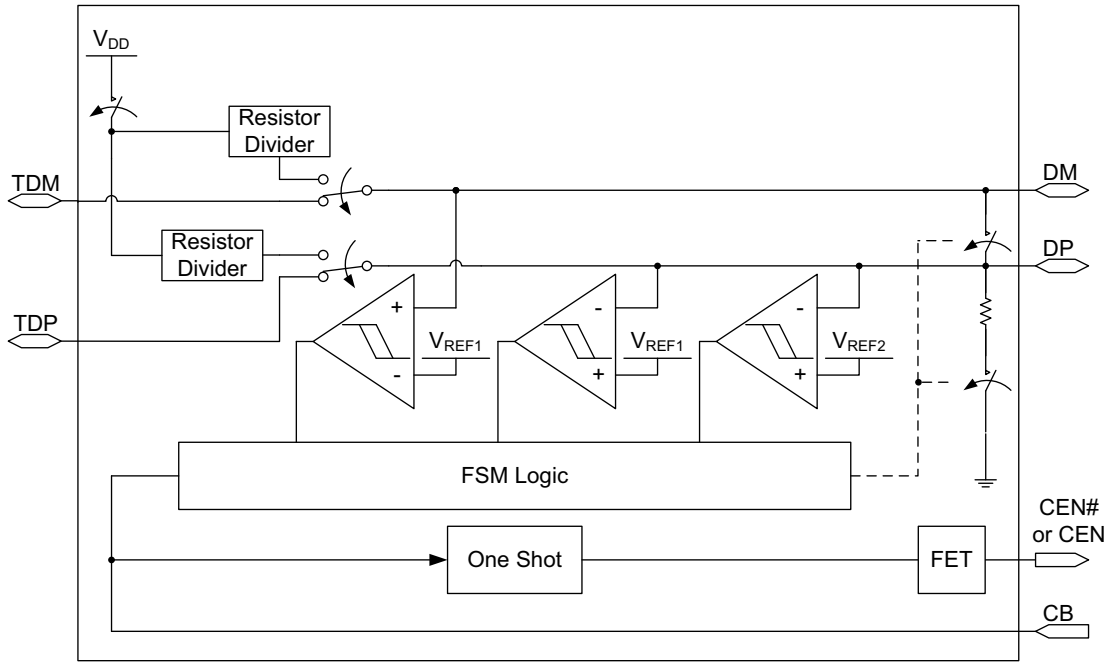
TDFN-8
(Top View)

Pin Configuration - SLG55587A



TDFN-8
(Top View)

Block Diagram



Pin Description - SLG55587

Pin #	Name	Type	Description
1	CEN#	Output	P-FET Open Drain Output. Current Limit Switch (CLS) Control Output. CB changes from 0 to 1 or 1 to 0. CEN# will be high for 2 seconds (typ)
2	DM	Input/Output	USB Connector D-
3	DP	Input/Output	USB Connector D+
4	GND	GND	Ground
5	VDD	PWR	Power Supply. Connect a 0.1µF capacitor between VDD and GND as close as possible to the device.
6	TDP	Input/Output	Host USB Transceiver D+ Connection
7	TDM	Input/Output	Host USB Transceiver D- Connection
8	CB	Input	Switch Control Bit 0 = autodetection charger identification active 1 = charging downstream port with active USB2.0 data communication mode with 1.5 A support
9	Thermal Pad	GND	Ground

Pin Description - SLG55587A

Pin #	Name	Type	Description
1	CEN	Output	N-FET Open Drain Output. Current Limit Switch (CLS) Control Output. CB changes from 0 to 1 or 1 to 0. CEN will be low for 2 seconds (typ)
2	DM	Input/Output	USB Connector D-
3	DP	Input/Output	USB Connector D+
4	GND	GND	Ground
5	VDD	PWR	Power Supply. Connect a 0.1µF capacitor between VDD and GND as close as possible to the device.
6	TDP	Input/Output	Host USB Transceiver D+ Connection
7	TDM	Input/Output	Host USB Transceiver D- Connection
8	CB	Input	Switch Control Bit 0 = autodetection charger identification active 1 = charging downstream port with active USB2.0 data communication mode with 1.5 A support
9	Thermal Pad	GND	Ground

Truth Table

CB	Function
0	DCP autodetect with mouse/keyboard wakeup
1	S0 charging with SDP only

Ordering Information

Part Number	Type
SLG55587V	TDFN-8
SLG55587AV	TDFN-8
SLG55587VTR	TDFN-8 - Tape and Reel
SLG55587AVTR	TDFN-8 - Tape and Reel

Absolute Maximum Conditions

Parameter	Min.	Max.	Unit
Supply Voltage	-0.3	6.0	V
Continuous Current into any terminal	-30	+30	mA
Continuous Power Dissipation	--	954	mW
Operating Temperature Range	-40	85	°C
Junction Temperature		150	°C
Storage Temperature Range	-65	150	°C
Lead Temperature (Soldering, 10s)		260	°C

Electrical Characteristics - Power Supply

V_{DD} = 4.5V to 5.5V, T_A = 25°C (unless specified otherwise)

Symbol	Parameter	Condition/Note	Min.	Typ.	Max.	Unit
V_{DD}	Power Supply Range	$V_{CB} > V_{IH}$	4.5	5.0	5.5	V
		V_{CB} = 0V	4.75	--	5.25	V
I_{DD}	Supply Current V_{DD} = 5V	CB = LOW (autodetect with wakeup)	--	120	140	µA
		CB = HIGH (SDP)	--	20	30	µA

Electrical Characteristics - Analog Switch

V_{DD} = 4.5V to 5.5V, T_A = 25°C (unless specified otherwise)

Symbol	Parameter	Condition/Note	Min.	Typ.	Max.	Unit
V_{DP}, V_{DM}	Analog signal Range		0	--	V_{DD}	V
R_{ON}	On Resistance TDP/TDM Switch	V_{DD} = -0.4V to 0.4V, I = 10mA	--	3.5	--	Ω
		V_{DP} = V_{DM} = 0V to V_{DD} V_{DD}= 5V	--	4.0	7	Ω
ΔR_{ON}	On Resistance Match between channels TDP/TDM Switch	V_{DD} = 5.0V V_{DP} = V_{DM} = 400mV I_{DP} = I_{DM} = 10mA	--	0.1	--	Ω
R_{FLAT}	On Resistance flatness TDP/TDM Switch	V_{DD} = 5.0V V_{DP} = V_{DM} = 0V to V_{DD} I_{DP} = I_{DM} = 10mA	--	0.5	--	Ω
R_{SHORT}	On Resistance of TDP/TDM Short	V_{CB} = 0V V_{DP} = 1V I_{DP} = I_{DM} = 10mA	--	50	70	Ω
I_{TDPOFF}, I_{TDMOFF}	Off-Leakage Current	V_{DD} = 3.6V V_{DP} = V_{DM} = 0.3V to 3.3V V_{TDP} = V_{TDM} = 3.3V to 0.3V V_{CB} = 0V	-250	--	250	nA
I_{DPON}, I_{DMON}	Off-Leakage Current	V_{DD} = 3.6V V_{DP} = V_{DM} = 3.3V to 0.3V V_{CB} = V_{DD}	-250	--	250	nA

Electrical Characteristics - Dynamic Performance

V_{DD} = 4.5V to 5.5V, T_A = 25°C (unless specified otherwise)

Symbol	Parameter	Condition/Note	Min.	Typ.	Max.	Unit
T_{ON}	Turn On Time	V_{TDP} or V_{TDM} = 1.5V R_L = 300Ω C_L = 35pF	--‘	20	100	µs
T_{OFF}	Turn Off Time	V_{TDP} or V_{TDM} = 1.5V R_L = 300Ω C_L = 35pF	--‘	1	5	µs
T_{PLH}, T_{PHL}	TDP/TDM Switch Propagation Delay	R_L = R_S = 50Ω	--	60	--	ps
T_{SKEW}	Output Skew	Skew between DP and DM when connected to TDP and TDM R_L = R_S = 50Ω	--	40	--	ps
C_{OFF}	TDP/TDM Off-Capacitance	f = 1MHz	--‘	2.0	--	pF
C_{ON}	DP/DM On-Capacitance	f = 240MHz	--‘	4.0	5.5	pF
BW	-3dB Bandwidth	R_L = R_S = 50Ω	--	1000	--	MHz
V_{ISO}	Off-Isolation	V_{TDP}, V_{DP} = 0dBm R_L = R_S =5 0Ω f = 250MHz	--	-20	--	dB
V_{CT}	Crosstalk	V_{TDP}, V_{DP} = 0dBm R_L = R_S = 50Ω f = 250MHz	--	-25	--	dB

Electrical Characteristics - Internal Resistors

V_{DD} = 4.5V to 5.5V, T_A = 25°C (unless specified otherwise)

Symbol	Parameter	Condition/Note	Min.	Typ.	Max.	Unit
R_{PD}	DP/DM Short Pull-down		350	500	700	kΩ
RT_{RP}	RP1/RP2 Ratio		1.485	1.5	1.515	Ratio
R_{RP}	RP1 + RP2 Resistance		93.75	125.0	156.25	kΩ
RT_{RM}	RM1/RM2 Ratio		0.8544	0.863	0.872	Ratio
R_{RM}	RM1 + RM2 Resistance		69.75	93.0	115.18	kΩ

Electrical Characteristics - Logic Input CB

V_{DD} = 4.5V to 5.5V, T_A = 25°C (unless specified otherwise)

Symbol	Parameter	Condition/Note	Min.	Typ.	Max.	Unit
V_{IH}	CB Input Logic High		1.4	--	--	V
V_{IL}	CB Input Logic Low		--	--	0.4	V
I_{IN}	CB Input Leakage Current	V_{DD} = 5.5V $0 \le V_{CB} \le V_{IL}$ or $V_{IH} \le V_{CB} \le V_{DD}$	-1	--	1	µA

Electrical Characteristics - CEN#/CEN Outputs

V_{DD} = 4.5V to 5.5V, T_A = 25°C (unless specified otherwise)

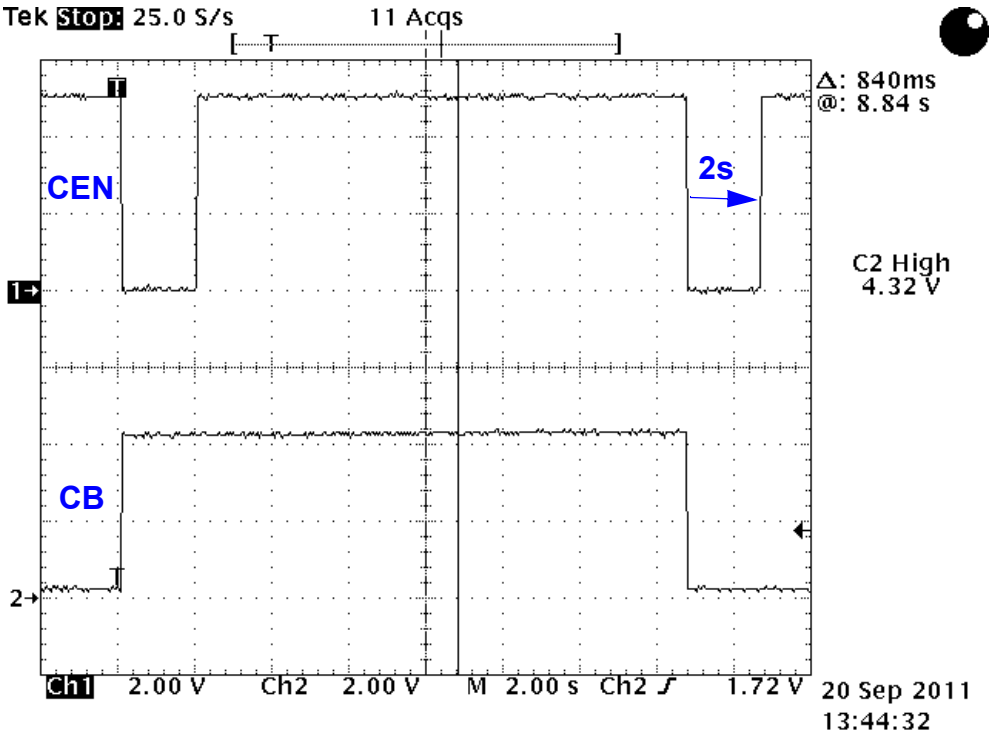
Symbol	Parameter	Condition/Note	Min.	Typ.	Max.	Unit
T_{VBT}	V_{BUS} Toggle Time	CB = Logic 0 to Logic 1 or Logic 1 to Logic 0	1.5	2.0	2.5	s
$V_{OH\_CEN\#}$	CEN# Output Logic High Voltage	CB = Logic 0 to Logic 1 I_{SOURCE} = 2mA	V_{DD}-0.4V	--	--	V
$I_{OUT\_CEN\#}$	CEN# Output Leakage Current	V_{DD} = 5.5V $V_{CEN\#}$ = 0V or CEN# deasserted	--	--	1	µA
V_{OL_CEN}	CEN Output Logic Low Voltage	CB = Logic 0 to Logic 1 I_{SINK} = 2mA	--	--	0.4V	V
I_{OUT_CEN}	CEN Output Leakage Current	V_{DD} = 5.5V V_{CEN} = 5.5V or CEN deasserted	--	--	1	µA

Electrical Characteristics - ESD Protection

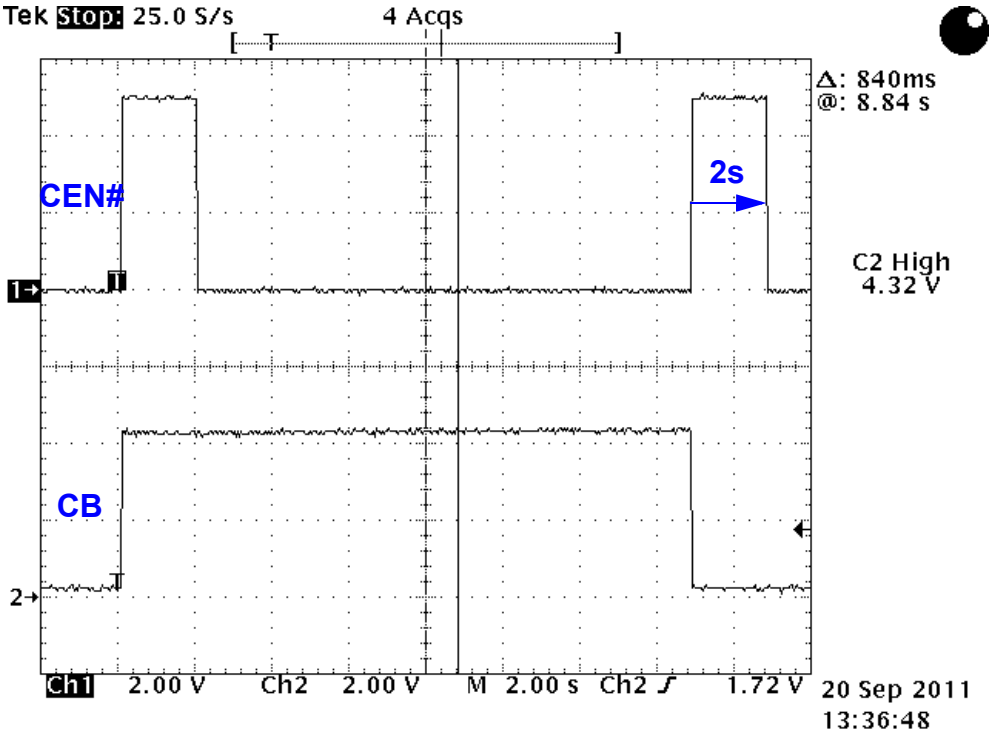
V_{DD} = 4.5V to 5.5V, T_A = 25°C (unless specified otherwise)

Symbol	Parameter	Condition/Note	Min.	Typ.	Max.	Unit
V_{ESD}	ESD Protection Level (DP and DM Only)	Human Body Model	--	±8	--	kV
V_{ESD}	ESD Protection Level (All other pins)	Human Body Model	--	±2	--	kV

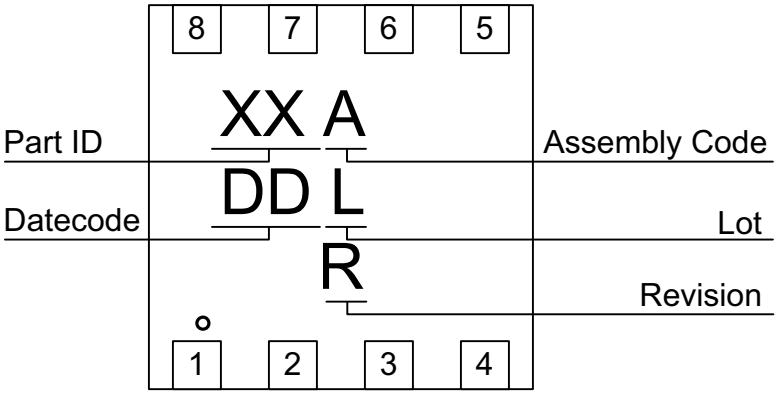
CEN Function Waveform



CEN# Function Waveform



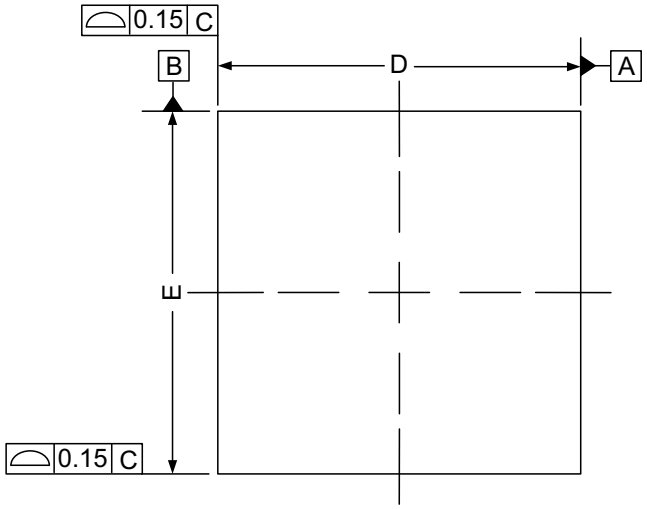
Package Top Marking System Definition



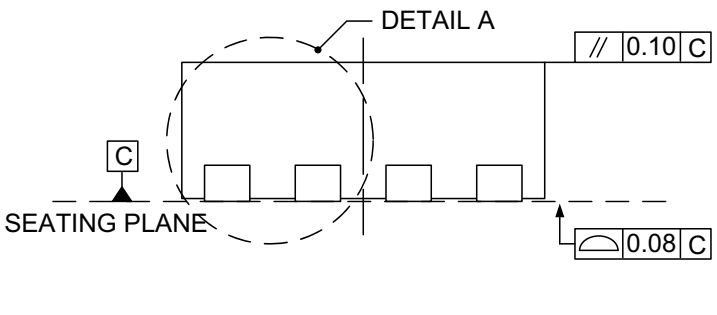
XX – Part ID Field: identifies the specific device configuration
A – Assembly Code Field: Assembly Location of the device.
DD – Date Code Field: Coded date of manufacture
L – Lot Code: Designates Lot #
R – Revision Code: Device Revision

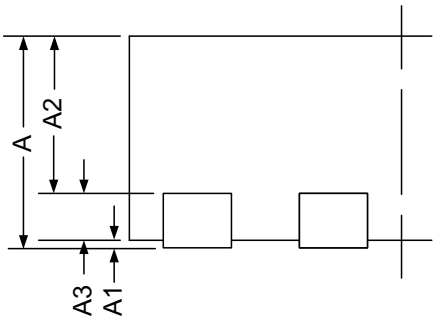
Package Drawing and Dimensions

8 Lead TDFN Package

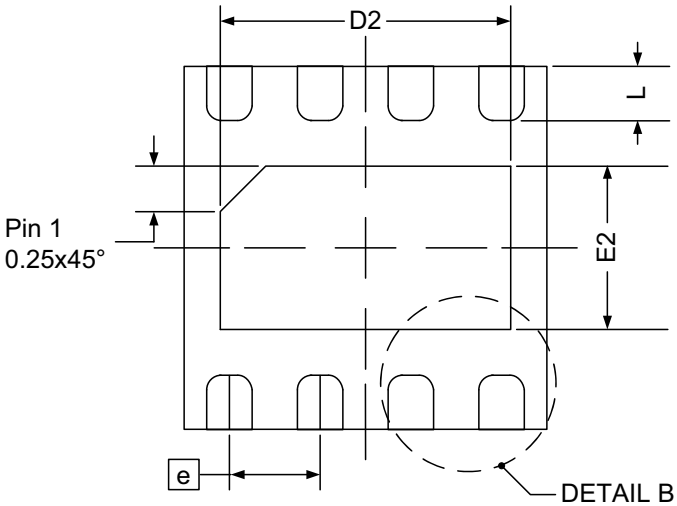


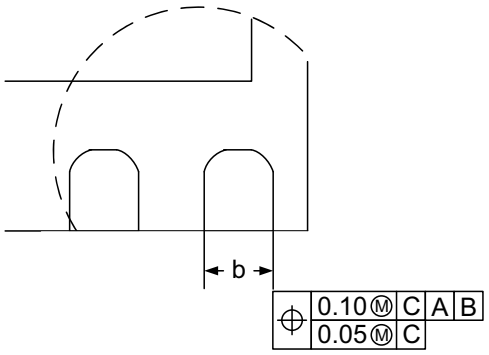
Symbol	Min (mm)	NOM (mm)	Max (mm)
A	0.70	0.75	0.80
A1	0.00	--	0.05
A2	--	0.55	--
A3	--	0.20	--
b	0.20	0.25	0.30
D	1.90	2.00	2.10
D2	1.50	1.60	1.70
E	1.90	2.00	2.10
E2	0.80	0.90	1.00
e	0.50 BSC		
L	0.20	0.30	0.40





DETAIL A





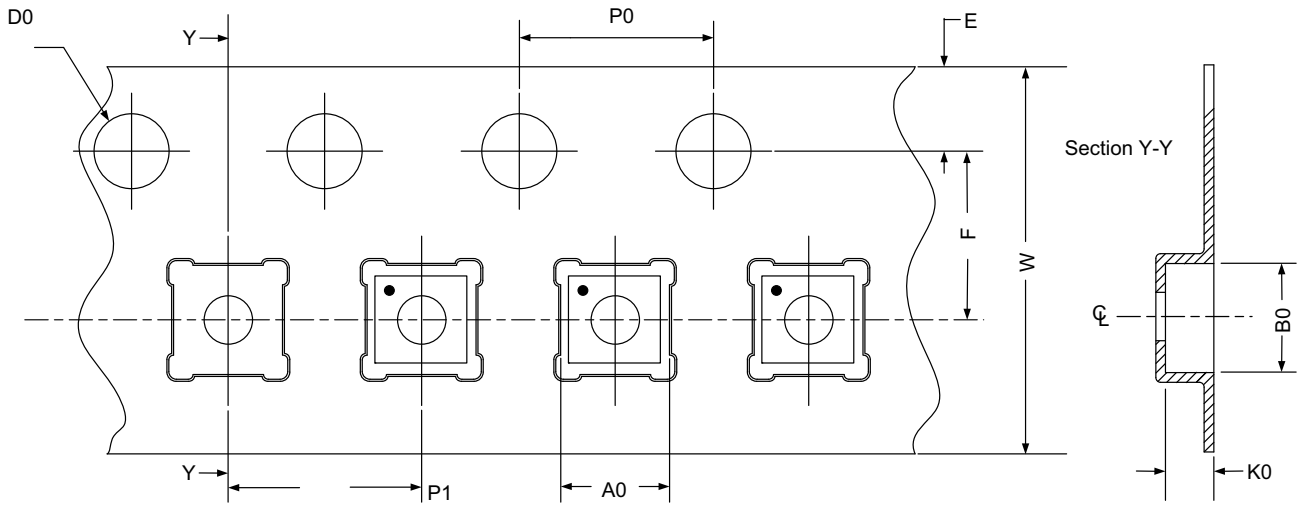
DETAIL B

Tape and Reel Specifications

Package Type	# of Pins	Nominal Package Size [mm]	Max Units		Reel & Hub Size [mm]	Leader (min)		Trailer (min)		Tape Width [mm]	Part Pitch [mm]
			per Reel	per Box		Pockets	Length [mm]	Pockets	Length [mm]		
TDFN 8L Green	8	2 x 2 x 0.75	3,000	3,000	178 / 60	42	168	42	168	8	4

Carrier Tape Drawing and Dimensions

Package Type	Pocket BTM Length	Pocket BTM Width	Pocket Depth	Index Hole Pitch	Pocket Pitch	Index Hole Diameter	Index Hole to Tape Edge	Index hole to Pocket center	Tape Width
	A0	B0	K0	P0	P1	D0	E	F	W
TDFN 8L Green	2.3	2.3	1.05	4	4	1.55	1.75	3.5	8



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