

General Description

The SLG55584/SLG55584A 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.

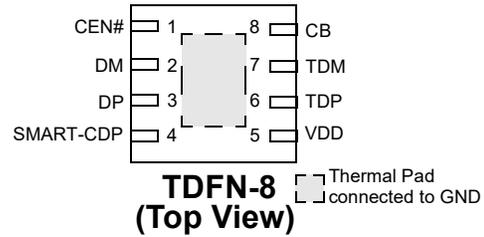
The SLG55584/SLG55584A can also support CDP mode (FAST charging and data communication available mode if smartphone can support CDP mode.)

The SLG55584/SLG55584A can also support low speed / full speed mouse/keyboard wake-up from S3 mode.

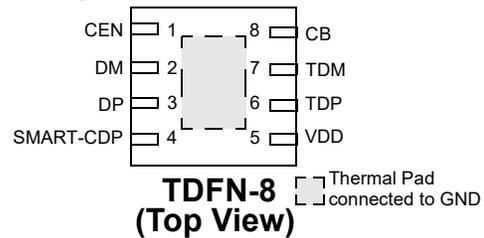
Features

- 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
- CDP Support (active USB 2.0 data communication with 1.5 A charging)
- Automatic CDP/SDP mode support with SMART-CDP=1 for "Always Data Communication"
- Pb-Free / RoHS Compliant
- Halogen-Free
- TDFN-8 Package

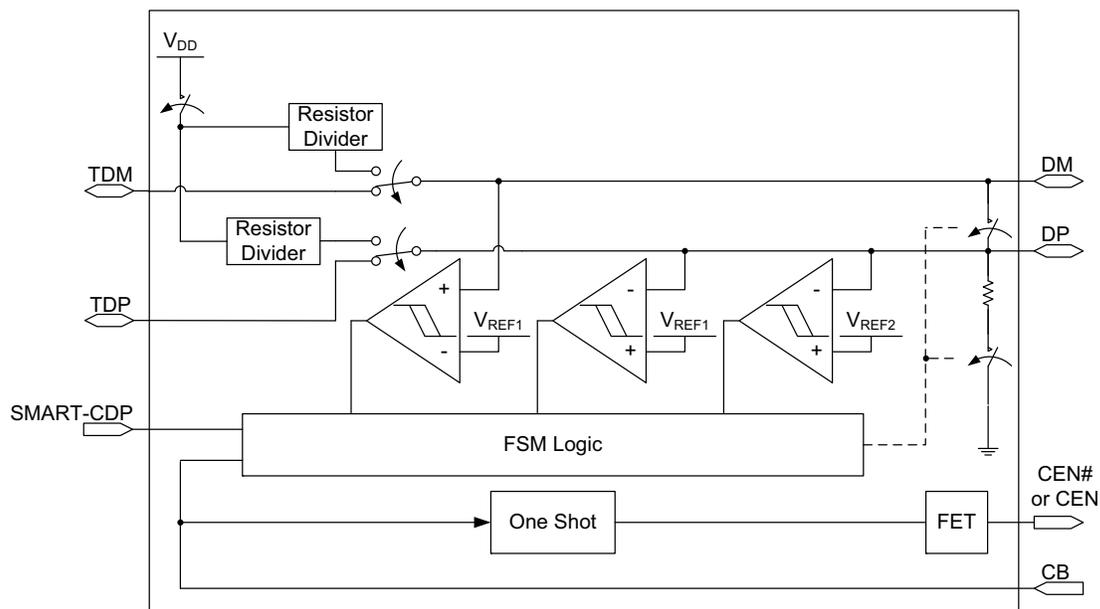
Pin Configuration - SLG55584



Pin Configuration - SLG55584A



Block Diagram



Pin Description - SLG55584

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	SMART-CDP	Input	Input Control logic (see truth table)
5	VDD	PWR	Power Supply. Connect a 0.1 μ F 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 - SLG55584A

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	SMART-CDP	Input	Input Control logic (see truth table)
5	VDD	PWR	Power Supply. Connect a 0.1 μ F 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	SMART-CDP	Function
0	X	DCP autodetect with mouse/keyboard wakeup
1	0	S0 charging with SDP only
1	1	S0 charging with CDP or SDP only (depending on external device) And, when Non-CDP phone is plugged in, the CDP mode will be changed automatically to SDP mode during handshaking protocol for supporting data communication.

Ordering Information

Part Number	Type
SLG55584V	TDFN-8
SLG55584AV	TDFN-8
SLG55584VTR	TDFN-8 - Tape and Reel
SLG55584AVTR	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 $5.5V$, $T_A = 25^\circ C$ (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, SMART-CDP = X (autodetect with wakeup)	--	120	140	μA
		CB = HIGH, SMART- = LOW (SDP)	--	20	30	μA
		CB = HIGH, SMART- = HIGH (CDP)	--	40	70	μA

Electrical Characteristics - Analog Switch

$V_{DD} = 4.5V$ to $5.5V$, $T_A = 25^\circ C$ (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 $5.5V$, $T_A = 25^\circ C$ (unless specified otherwise)

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

Electrical Characteristics - Internal Resistors

$V_{DD} = 4.5V$ to $5.5V$, $T_A = 25^\circ C$ (unless specified otherwise)

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

Electrical Characteristics - Logic Input CB

$V_{DD} = 4.5V$ to $5.5V$, $T_A = 25^\circ C$ (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	$V_{DD} = 5.5V$ $0 \leq V_{CB} \leq V_{IL}$ or $V_{IH} \leq V_{CB} \leq V_{DD}$	-1	--	1	μA

Electrical Characteristics - Logic Input SMART-CDP

$V_{DD} = 4.5V$ to $5.5V$, $T_A = 25^\circ C$ (unless specified otherwise)

Symbol	Parameter	Condition/Note	Min.	Typ.	Max.	Unit
V_{IH}	SMART-CDP input Logic High		3.0	--	--	V
V_{IL}	SMART-CDP input Logic Low		--	--	0.8	V
I_{IN}	SMART-CDP Input Leakage Current	$V_{DD} = 5.5V$ $0V < V_{SMART-CDP} < V_{IL}$ or $V_{IH} < V_{SMART-CDP} < V_{DD}$	-1	--	1	μA

Electrical Characteristics - CEN#/CEN Outputs

$V_{DD} = 4.5V$ to $5.5V$, $T_A = 25^\circ C$ (unless specified otherwise)

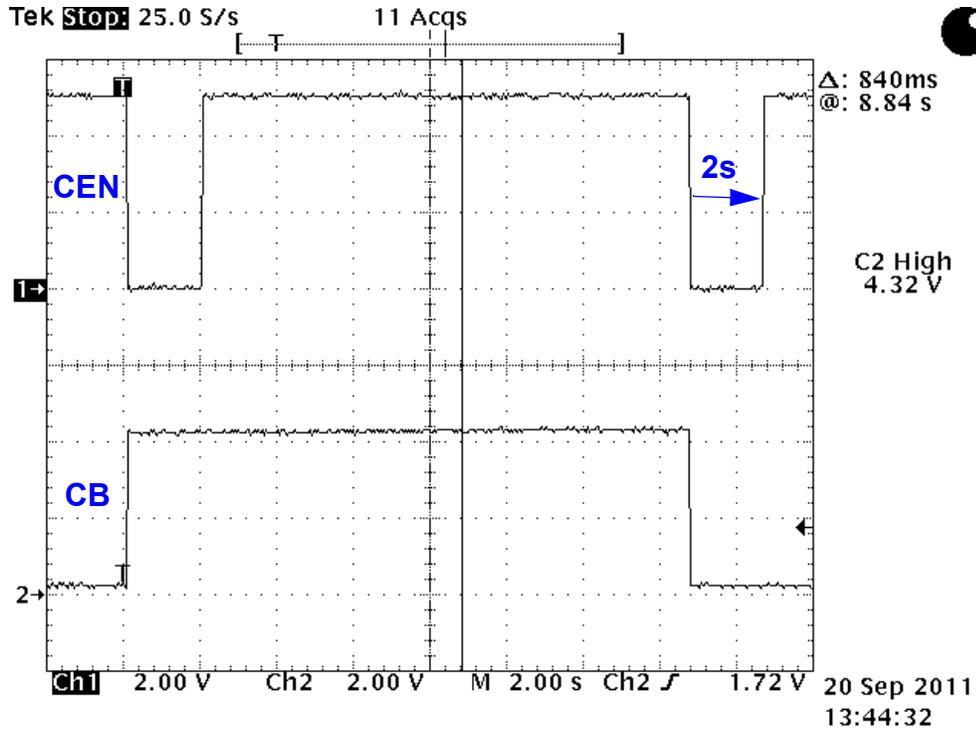
Symbol	Parameter	Condition/Note	Min.	Typ.	Max.	Unit
T_{VBT}	V_{BUS} Toggle Time	CB = Logic 0 to Logic 1 or Logic 1 to Logic 0	1.5	2.0	2.5	s
$V_{OH_CEN\#}$	CEN# Output Logic High Voltage	CB = Logic 0 to Logic 1 $I_{SOURCE} = 2mA$	$V_{DD}-0.4V$	--	--	V
$I_{OUT_CEN\#}$	CEN# Output Leakage Current	$V_{DD}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

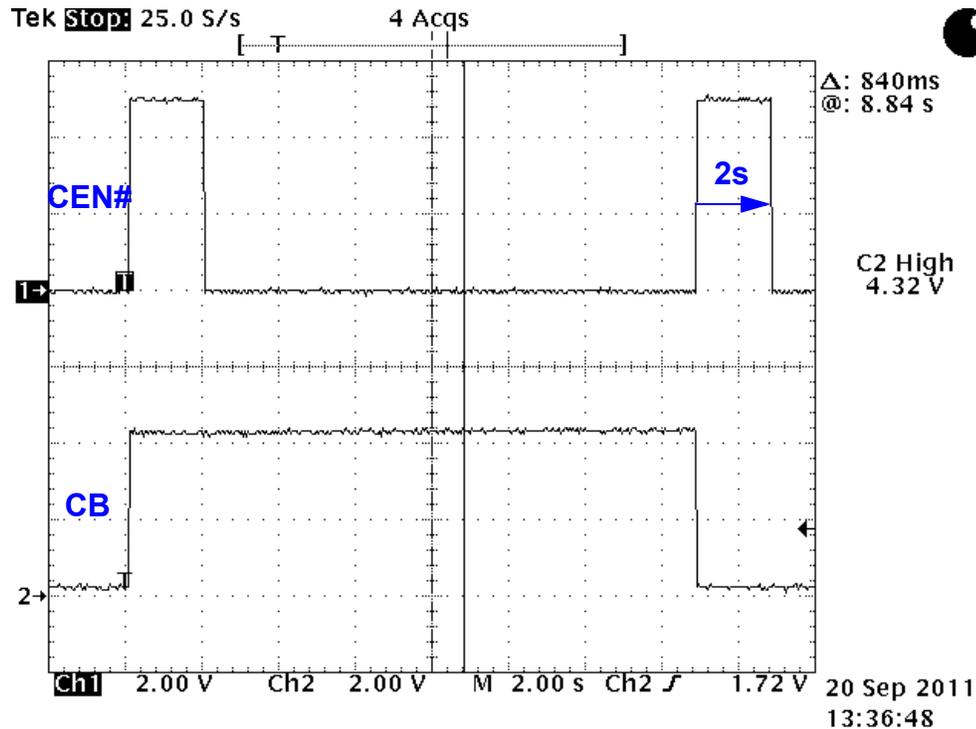
$V_{DD} = 4.5V$ to $5.5V$, $T_A = 25^\circ C$ (unless specified otherwise)

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

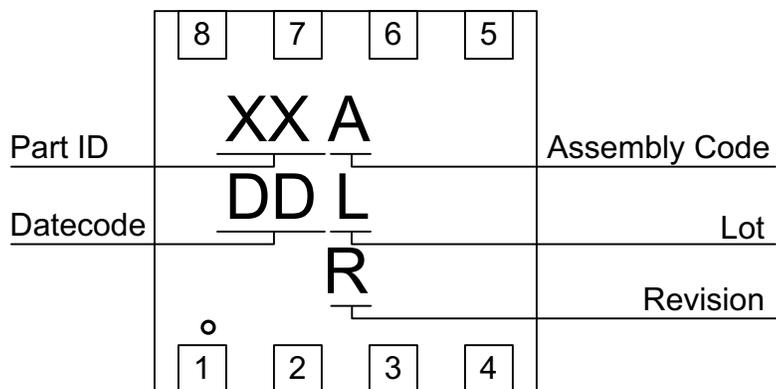
CEN Function Waveform



CEN# Function Waveform

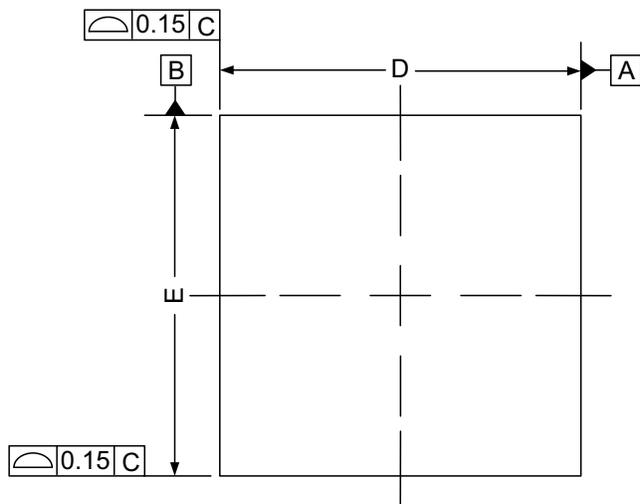


Package Top Marking System Definition

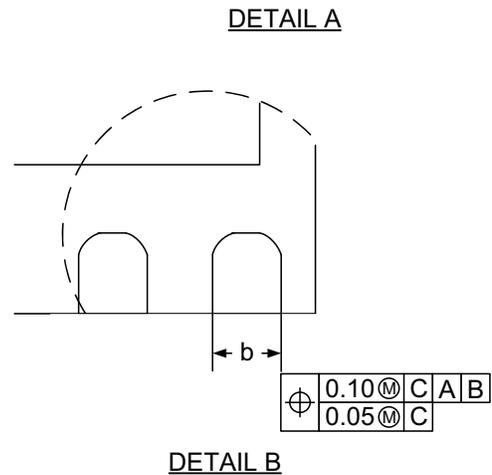
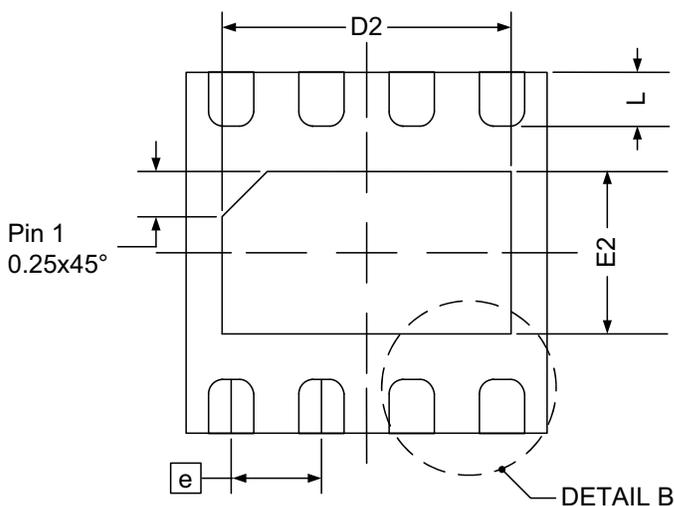
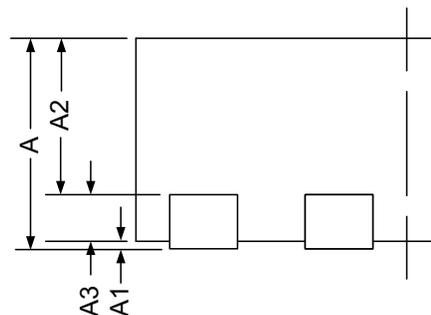
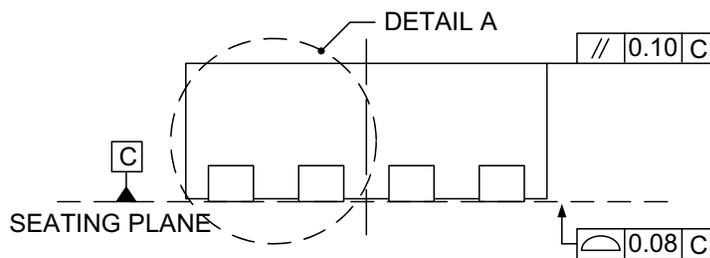


- XX – Part ID Field: identifies the specific device configuration
- A – Assembly Code Field: Assembly Location of the device.
- DD – Date Code Field: Coded date of manufacture
- L – Lot Code: Designates Lot #
- R – Revision Code: Device Revision

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

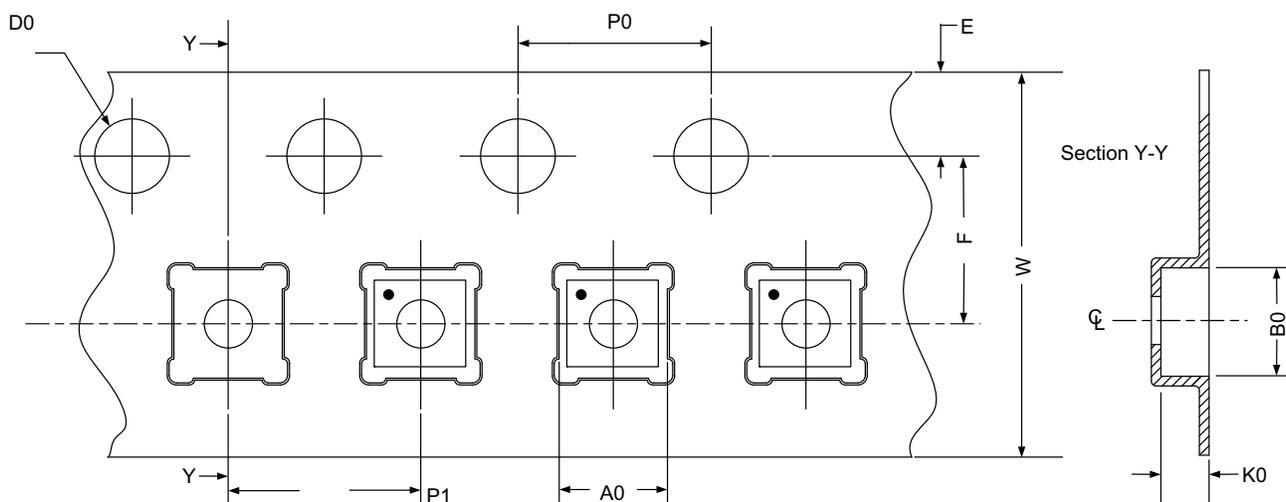


Tape and Reel Specifications

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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