

GPT65Z1SHD

100V ▲ 140mA ▲ GaN JFET

GALLIUM NITRIDE GaN JFET ▲ SMD type

Normally-on device

Depletion mode HEMT for non-switching use

Small size ▲ 3535 PLCC package

Larger input voltage compared to linear IC ▲ $V_{DSOP} = 100V$

Simple to design ▲ Few peripheral components

SPECIFICATION




Item ($T_c = 25^\circ C$, unless otherwise noted)		Characteristics
Operating Temperature Range	T_J	$-55^\circ C$ to $+150^\circ C$
Storage Temperature Range	T_S	$-55^\circ C$ to $+150^\circ C$
Drain-Source Maximum Operating Voltage	V_{DSOP}	100V
Drain-Source Breakdown Voltage	BV_{DS}	650V
Continuous Drain Load Current	I_{DL}	140mA

DESCRIPTION

GPT65Z1SHD, Gallium Nitride (GaN) JFET is a normally-on device. Depletion Mode HEMT design for non-switching use.

GaN offers improved efficiency over silicon, through lower gate charge, lower crossover loss, and smaller reverse recovery charge.

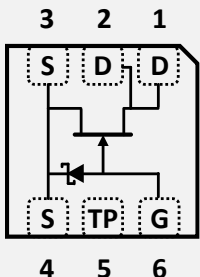
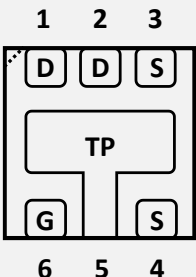
APPLICATIONS

AC/DC LED Power Supply	LED AC Lamps < 50W	LED DC Lamps < 50W
		

BENEFITS

- ▲ Small size linear constant current IC
- ▲ High V_{DS} , larger input voltage range compared to general linear IC
- ▲ Usable for AC or DC LED designs from 4W to 50W
- ▲ Few peripheral passive components necessary

PIN DESCRIPTION

Circuit Diagram - Top View	Outline - Bottom View	Pin No.	Symbol	Description
		1	D	Drain
		2	D	Drain
		3	S	Source
		4	S	Source
		5	TP	Thermal Pad
		6	G	Gate

ABSOLUT MAXIMUM RATINGS ▲ $T_C = 25^\circ\text{C}$, unless otherwise noted

Item	Symbol	Limit	Unit
Drain-Source Breakdown Voltage	BV_{DS}	650	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ^{Note 1}	I_{DS}	350	mA

Note

- 1: Maximum operating voltage is 100V. Maximum continuous load current is 140mA.
Operating power $P_{OP} = V_{DSOP} \times I_{DL} \leq 3.5W$

ELECTRICAL CHARACTERISTICS ▲ $T_C = 25^\circ\text{C}$, unless otherwise noted

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
Forward Device Characteristics						
Drain-Source Voltage	$V_{GS} = -6V, I_D = 100\mu A$	V_{DSS}	650			V
Gate-Source Threshold Voltage	$V_{DS} = 10V, I_D = 1mA$	V_{GSth}		-4.7		V
Drain-Source Leakage Current	$V_{DS} = 500V, V_{GS} = -5V$	I_{DSS}			90	μA
Gate-Source Leakage Current	$V_{GS} = -5V, V_{DS} = 0V$	I_{GSS}			5	μA
Continuous Drain Load Current	$V_{DS} = 2V, V_{GS} = 0V$	I_{DL}			140	mA
Saturation Drain Current	$V_{DS} = 10V, V_{GS} = 0V$	$I_{DSat} (DC 10V)$			350	mA
Saturation Drain Current	$V_{DS} = 20V, V_{GS} = 0V$	$I_{DSat} (DC 20V)$			300	mA
Drain-Source On-State Resistance	$V_{GS} = 0V, I_D = 50mA$	$R_{DS(ON)}$			16	Ω

THERMAL CHARACTERISTIC RATINGS

Items		Typ.
Thermal Resistance Junction to Ambient ^{Note 2}	R _{thJA}	35°C/W
Thermal Resistance Junction to Case	R _{thJC}	8.5°C/W

Note

- 1: Device on one layer epoxy PCB for drain connection (vertical and without air stream cooling, with 6cm² copper and 70 μ m thickness).

REFERENCE DATA

Fig. 1 • Typ. Output Characteristics I_D vs. V_{DS} ,
 $T_J = 25^\circ\text{C}$

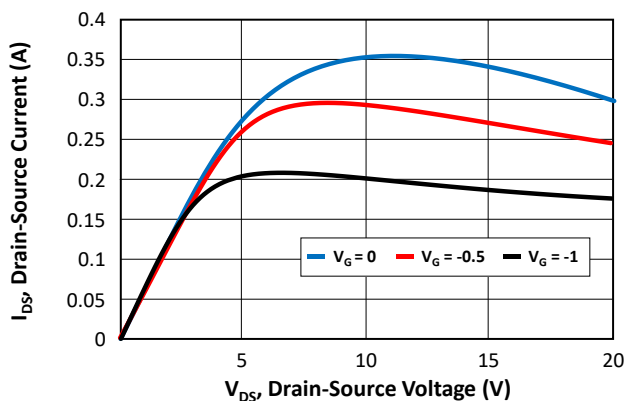
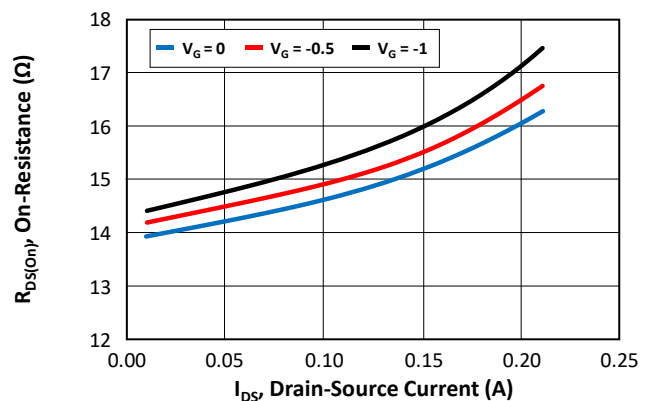
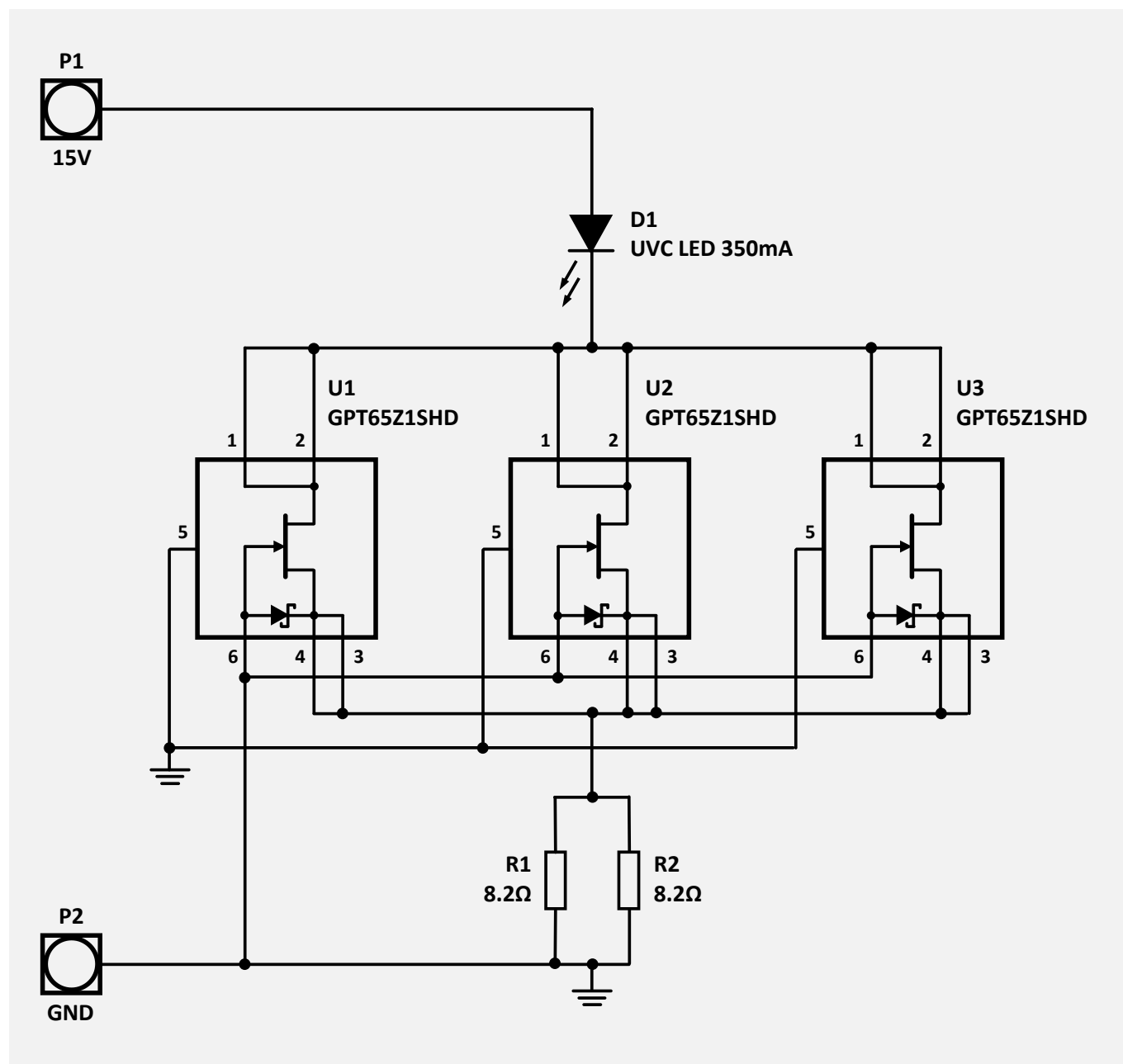


Fig. 2 • Typ. $R_{DS(ON)}$ vs. I_{DS} ,
 $T_J = 25^\circ\text{C}$



TYPICAL APPLICATION CIRCUIT ▲ UVC LED MODULE

Fig. 3 - UVC LED Module Circuit Diagram



BILL OF MATERIAL

Item No.	Quantity	Value	Ref. Des.	Description	Package
1	1		D1	UVC LED 2.6W, $\lambda = 260\text{nm to } 270\text{nm}$	SON3535-2P
2	2	8.2Ω	R1, R2	Resistor 8.2Ω, 1%, $\pm 100\text{ppm}$, 0.25W	1206
3	3		U1, U2, U3	GPT65Z1SHD, GaN FET	SON3535-6P

TYPICAL APPLICATION CIRCUIT ▲ UVC LED MODULE

Fig. 4 ▀ System Diagram

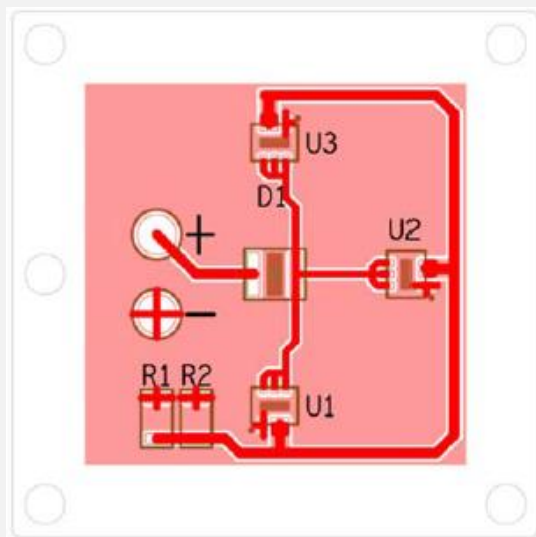
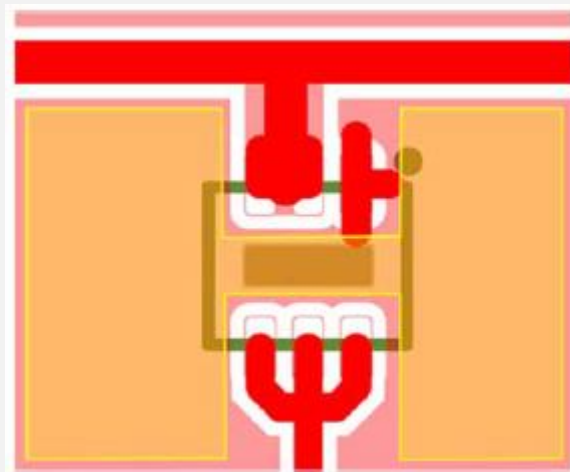


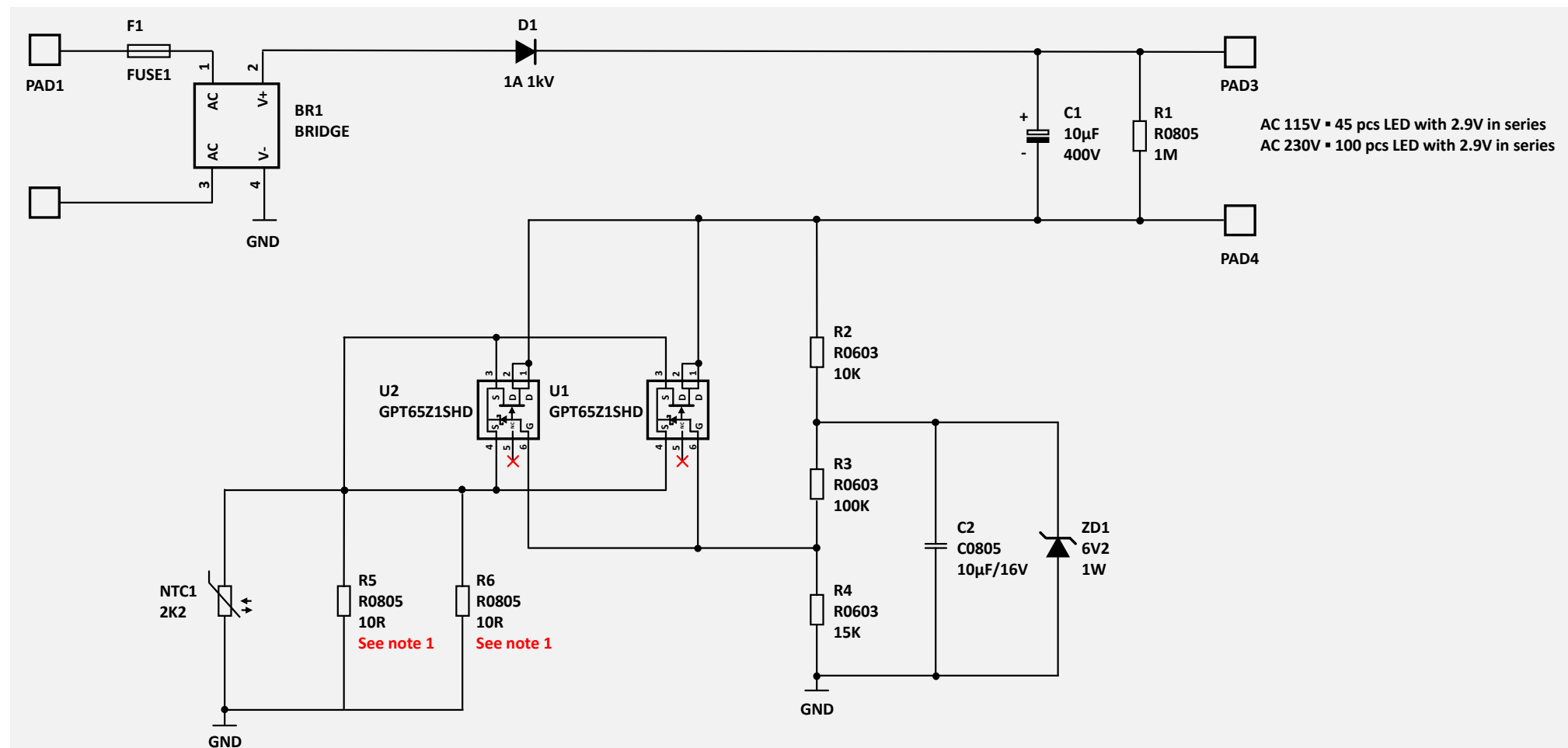
Fig. 5 ▀ PCB Layout Note



1. Copper pouring process at the bottom, heat dissipation increases reliability.
2. The copper casting area is as large as possible, the min. area : 12mm X 12mm.
3. Keep away from high power components.

TYPICAL APPLICATION CIRCUIT ▲ 8W or 16 W LED MODULE

Fig. 6 - 8W or 16W LED Module Circuit Diagram



Note

1: R5/R6 sets the output current and therefore the output power. High ohm values reduce the output power. See recommended resistor values for 4W to 16W on page 6.

RECOMMENDED RESISTORS TO SET THE OUTPUT CURRENT

Output Power	4W	8W	12W	16W
Output Current	30mA	60mA	90mA	120mA
Resistor Value R5	120Ω	43Ω	24Ω	10Ω
Resistor Value R6	120Ω	43Ω	24Ω	10Ω

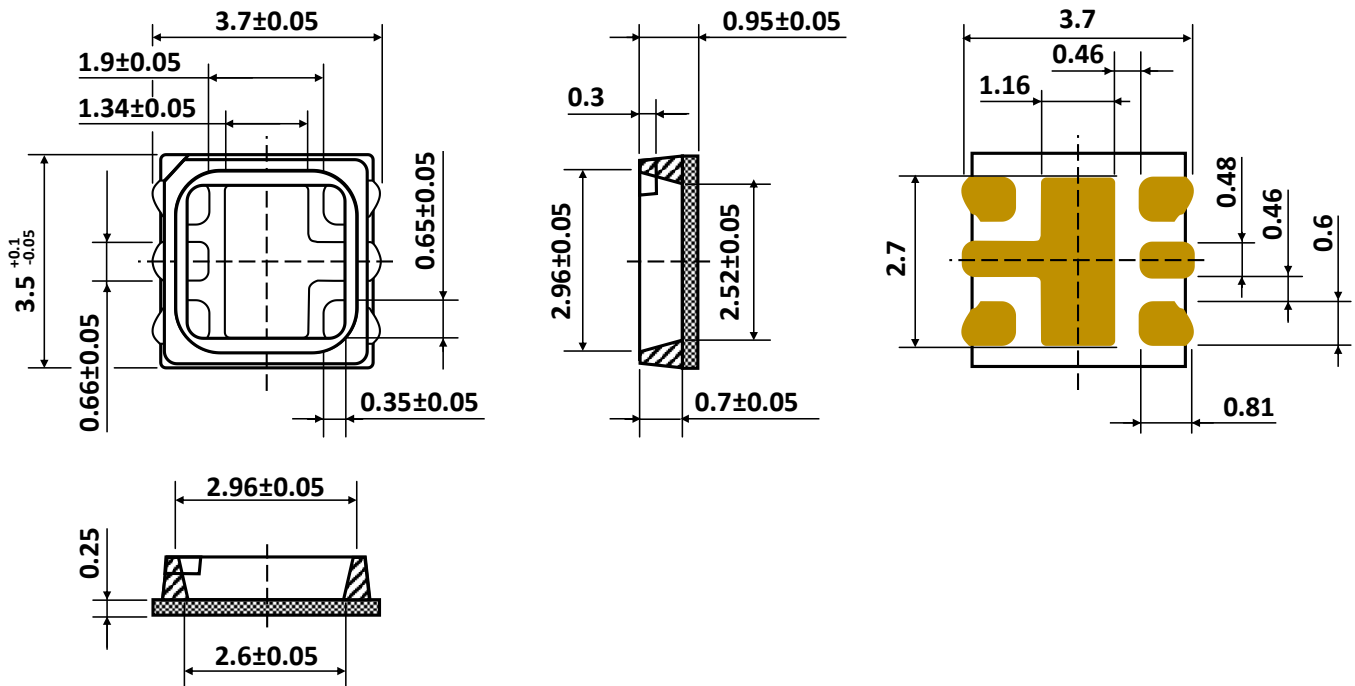
Note:

For safety reasons, it is not recommended to use the full 140mA load in circuit design.
20mA less than full load is a good value.

BILL OF MATERIAL ▲ MOTHERBOARD

Item	Type	Designator	Description	Qty
1	Fuse	F1	2410/500mA/250V	1
2	Bridge Rectifier	BR1	MBLS 500mA/1kV	1
3	Alu Electrolytic Cap.	C1	10uF/400V/10x18mm/105°C/10000h	1
4	MLCC	C2	0805 10μF/16V/X7R/10%	1
5	Rectifier	D1	S1MFL 1A/1kV/SOD-123FL	1
6	Zener Diode	ZD1	KDZV6.2B 6.2V/1W/SOD-123	1
7	GaN Fet	U1,U2	GPT65Z1SHD 140mA/100V/PLCC3535	2
8	Chip Resistor	R1	0805 1M/5%/200ppm	1
9	Chip Resistor	R2	0603 10K/5%/200ppm	1
10	Chip Resistor	R3	0603 100K/5%/200ppm	1
11	Chip Resistor	R4	0603 15K/5%/200ppm	1
12	Chip Resistor	R5,R6	1206 10R/1%/100ppm	2
13	Chip NTC	NTC1	0805 2K2/5%/200mW	1

PACKAGE OUTLINE



STORAGE AND HANDLING CONDITIONS

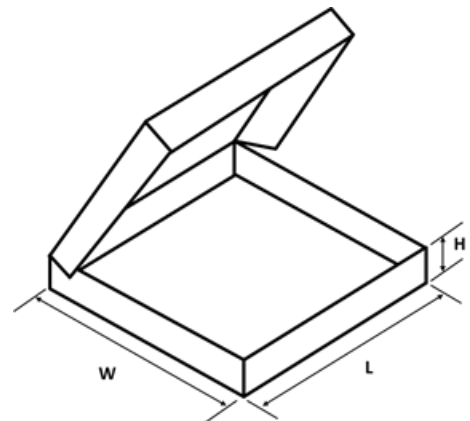
ESD level	Floor life	Conditions	MSL
HBM class 2	168 hours	$T_A < 30^\circ\text{C}$, RH < 60%	3

ORDERING INFORMATION

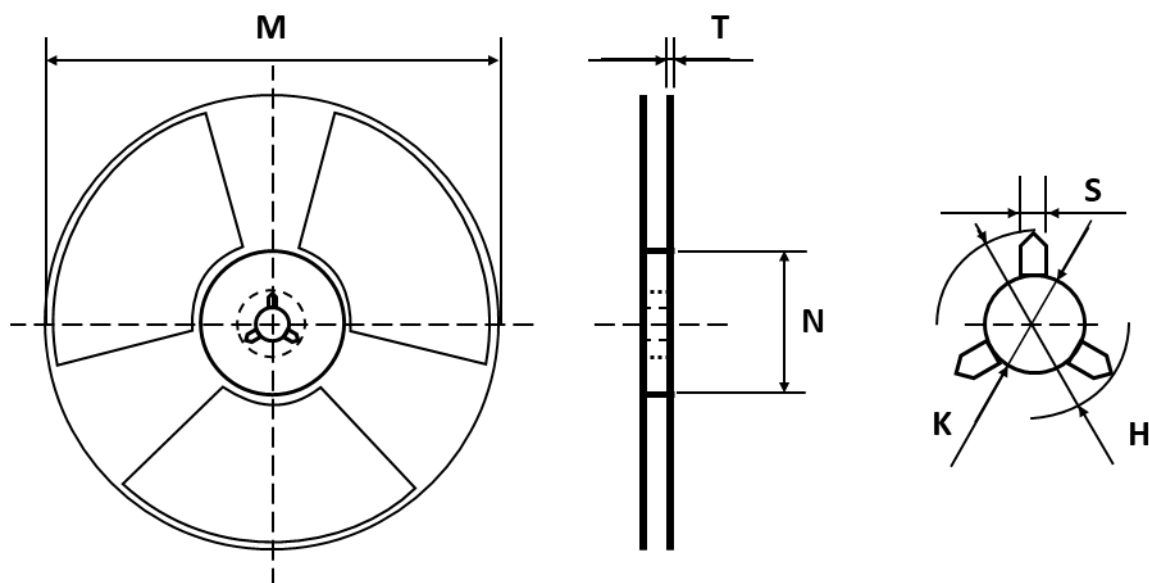
Part Number	Package	Packing	Quantity	Reel Diameter
GPT65Z1SHD	3535 PLCC	Tape and Reel	3 000pcs	330mm (13")

REEL BOX DIMENSION ▲ All dimensions in mm

Outside Dimensions	
Ø 330mm reel	
W	450
L	450
H	80

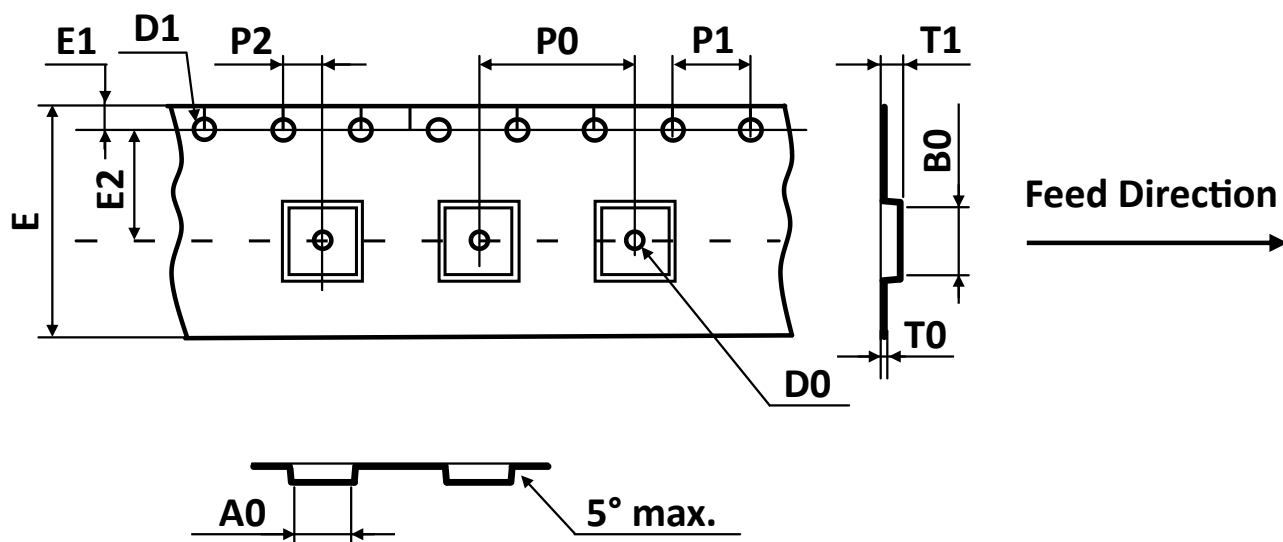


REEL DIMENSIONS ▲ All dimensions in mm



Tape Size	Reel Size	M	N	T	H	K	S
12mm	Ø330	Ø330.00 ±0.20	Ø102.00 ±0.10	2.00 ±2.0	13.00 +0.50 -0.20	10.50 ±0.25	2.00 ±0.25

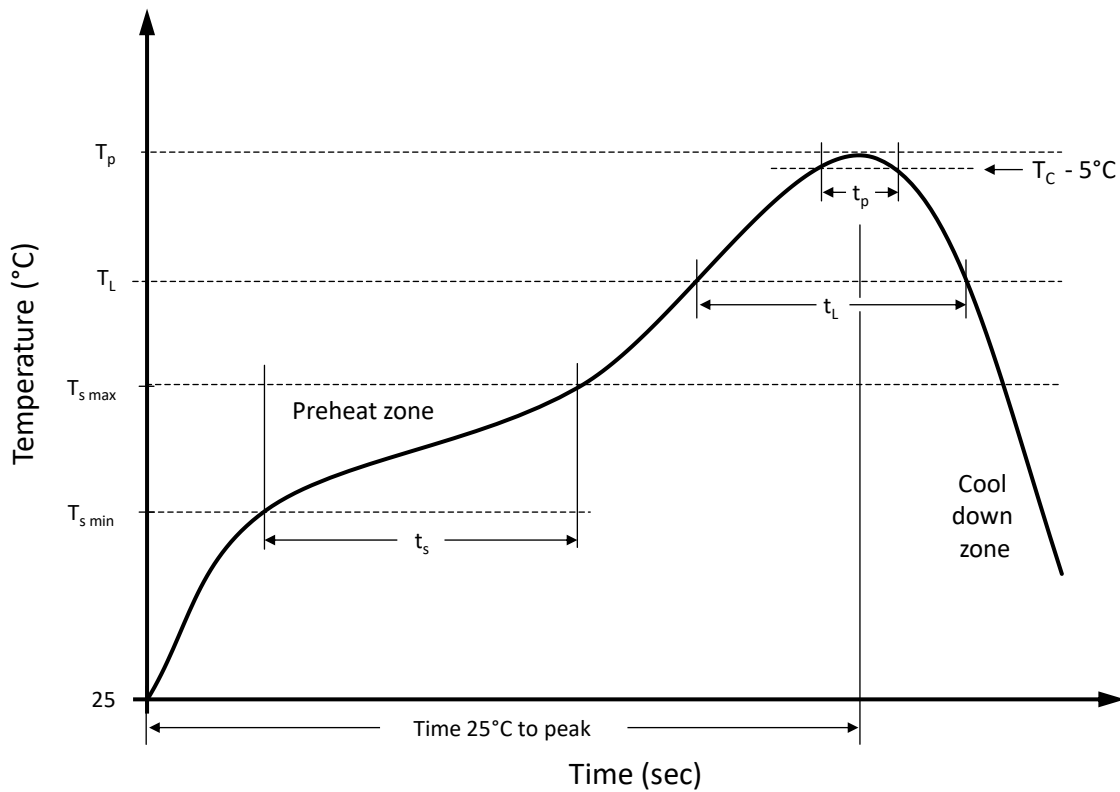
TAPE DIMENSIONS ▲ All dimensions in mm



Package	A0	B0	D0	D1	E	E1	E2	P0	P1	P2	T0	T1
3535 PLCC	4.01 ±0.05	3.81 ±0.05	1.50 +0.25	1.50 ±0.10	12.00 +0.30 -0.10	1.75 ±0.10	5.50 ±0.05	8.00 ±0.10	4.00 ±0.10	2.00 ±0.05	1.08 ±0.05	0.20 ±0.02

Note: All dimensions meet EIA-481-D requirements.

RECOMMENDED REFLOW SOLDERING PROFILE



Recommended reflow soldering conditions ▲ Refer to JEDEC J-STD-020E

Profile Features		Sn-Pb Eutetic Assembly	Pb-Free Assembly
Preheat temperature min.	T _{s min}	100 °C	150 °C
Preheat temperature max.	T _{s max}	150 °C	200 °C
Preheat time t _s from T _{s min} to T _{s max}	t _s	120 seconds	120 seconds
Ramp-up rate (T _L to T _p)		max. 3 °C/second	max. 3 °C/second
Liquidous temperature	T _L	183 °C	217 °C
Time t _L maintained above T _L	t _L	150 seconds max.	150 seconds max.
Peak package body temperature	T _p	235°C	260°C
Timeframe of within 5°C below and up to max actual peak body temperature	t _p	20 seconds max.	30 seconds max.
Ramp-down rate (T _L to T _p)		max. 6 °C/second	max. 6 °C/second
Time 25°C to peak temperature		max. 6 minutes	max. 8 minutes

REVISION TABLE

Revision	Date	Status	Notes
001	01/01/2022	Initial release	Initial publication
002	30/03/2022	Second release	Add recommended resistors to set the output current

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