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台舟电子

TPU40200CSP4
Low Quiescent current Load Switch

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Features

- Wide Supply Voltage Range: 1.5V to 5.5V
- Quiescent current :0.4uA @ Typ
- Standby current : 80nA @ Typ
- Maximum Output current : 2A
- Enable Active High
- Typical Rdson 32mΩ @5.5V
- Controlled Rise Time：570us at 3.3VIN
- Quick Output Discharge (QOD) : 85Ω (Typ.)
- Hot Plug-In Application(Soft start)
- Reverse Current Flow Blocking (no body diode)
- RoHS and Halogen free compliance
- ESD Protection: 2kV HBM, 200V MM
- Package WLCSP-4L

General Description

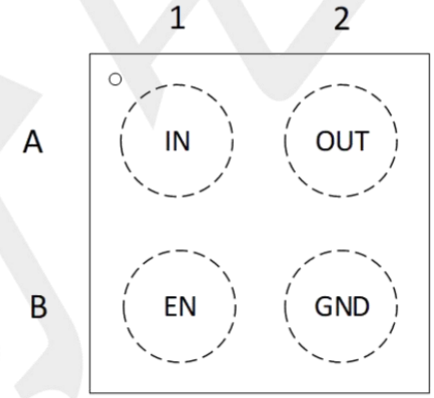
The is a small, single channel load switch using P-Channel MOSFET for minimum power loss. Advanced gate control design supports operating voltages as low as 1.5 V with minimal increase in ON-Resistance and power loss. It is designed for load switching applications with ultra-low quiescent current (0.5uA) and ultra-low standby current (150nA).

The offers industry leading True Reverse Current Blocking performance. It minimizes reverse current flow in the event that the VOUT pin voltage exceeds the VIN voltage. The device is controlled by external logic pin, allowing optimization of battery life, and portable device autonomy.

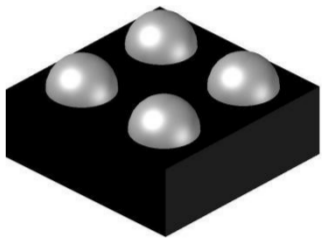
Applications

- Notebook and Desktop Computers
- High-Side Power Protection Switchs
- Consumer Electronics
- Telecom Systems
- Wearables
- USB Device Power Switch
- Portable Speakers

Pin Information



Pin Information（Top-Through View）



WLCSP- 4L

Pin Configurations

Pin Number	Pin Name	Pin Function
A1	IN	Power Supply Input.
A2	OUT	Output Voltage Pin.
B1	EN	Enable (Active high)
B2	GND	Ground.

Absolute Maximum Ratings

Parameter	Symbol	Condition	Min.	Max.	Unit
Input voltage	V_{IN}		-0.3	6	V
Output voltage	V_{OUT}		-0.3	6	V
Enable voltage	V_{EN}		-0.3	6	V
Maximum continuous switch current	I_{MAX}		--	2	A
Maximum junction temperature	$T_{J,MAX}$		--	125	℃
Lead Temperature	T_{LEAD}	Soldering, 10 sec.	--	300	℃
Storage Temperature Range	T_{STG}		-65	150	℃
Human Body Model，JESD22-A114	HBM		4000		V
Charged Device Model, JESD22-C101	CDM		2000		V
MSL			Level 1		

The absolute maximum ratings are stress ratings only. Stresses exceeding the range in Table might cause substantial damage to the device. Functional operation of the device under other conditions is not implied. Prolonged exposure to extreme conditions might affect device reliability.

Thermal Information

Parameter	Symbol	Value	Unit
Junction-to-Ambient thermal resistance	$R_{\theta JA}$	110	℃/W

Surface mounted on FR-4 Board using 2 oz, 4 layer board, PCB board size is 3*3 square inches

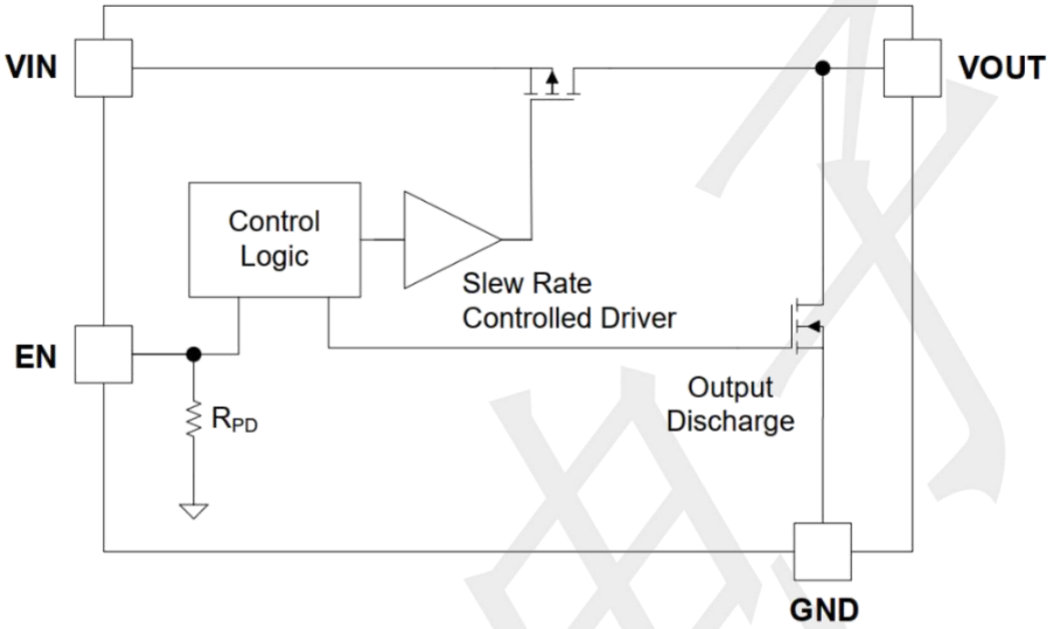
Recommended Operation Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Input Voltage	V_{IN}	1.5	--	5.5	V
Enable voltage	V_{EN}	0	--	5.5	V
Output voltage	V_{OUT}	0	--	5.5	V
Operating Junction Temperature	T_J	-40	--	125	℃
Operating Ambient Temperature	T_A	-40	--	85	℃

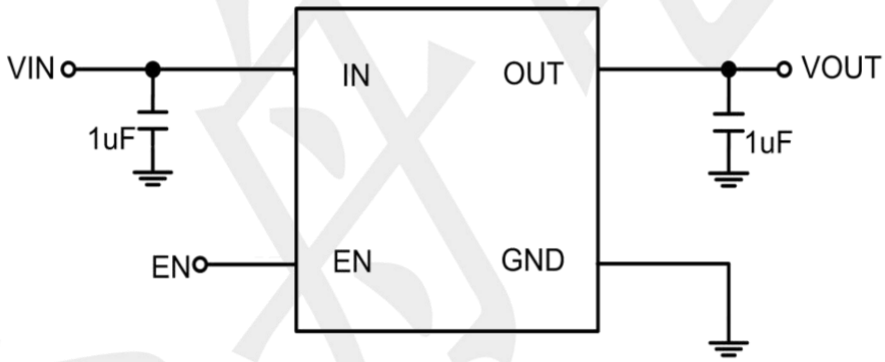
Electrical Characteristics (Ta=25°C, V_{IN}=3.3V, C_{IN}=C_{OUT}=1μF, unless otherwise noted)

Symbol	Parameter	Conditions		Min	Typ	Max	Units
Basic Operation							
I_Q	Quiescent Current	EN = Enable, I_{OUT}=0 mA, V_{IN} = V_{EN} =5.5 V		--	0.4	--	uA
		EN=Enable,I_{OUT}=0mA,V_{IN}=V_{EN}=5.5V, 85 °C		--	0.7	--	
I_{SD}	Shut Down Current	EN = Disable, I_{OUT}=0 mA, V_{IN}=1.5 V		--	65	--	nA
		EN = Disable, I_{OUT}=0 mA, V_{IN}=3.3 V		--	70	--	
		EN = Disable, I_{OUT}=0 mA, V_{IN}=4.2 V		--	75	--	
		EN = Disable, I_{OUT}=0 mA, V_{IN}=5.5 V		--	80	--	
		EN= Disable, I_{OUT}=0 mA, V_{IN}=5.5 V, 55 °C		--	140	--	
R_{ON}	On-Resistance	V_{IN}=5.5 V, I_{OUT}= 500 mA	Ta=25 °C	--	32	--	mΩ
			Ta=85 °C	--	36	--	
		V_{IN}=3.3 V, I_{OUT}= 500 mA	Ta=25 °C	--	42	--	
			Ta=85 °C	--	48	--	
		V_{IN}=1.8 V, I_{OUT}= 300 mA	Ta=25 °C	--	72	--	
		V_{IN}=1.5 V, I_{OUT}= 100 mA	Ta=25 °C	--	100	--	
R_{DSC}	Output Discharge Resistance	E_N=Low , I_{FORCE}= 10 mA		--	85	--	Ω
V_{IH}	ENInput Logic High Voltage	V_{IN}=1.5-5.5 V		1.2	--	--	V
V_{IL}		V_{IN}=1.5-5.5 V		--	--	0.4	V
REN	EN pull down resistance	Internal Resistance		--	10	--	MΩ
I_{EN}	EN Current	E_N=V_{IN} or GND		--	0.5	--	uA
V_{RCB_TH}	RCB Protection Threshold Voltage	V_{OUT} – V_{IN}		--	25	--	mV
V_{RCB_RL}	RCB Protection Release Voltage	V_{IN} – V_{OUT}		--	30	--	mV
Switching Characteristics							
t_{dON}	Turn-On Delay	R_L=150 Ω, C_{OUT}=0.1 μF		--	430	--	us
t_R	V_{OUT} Rise Time			--	570	--	
t_{dOFF}	Turn-On Delay	R_L=150 Ω, C_{OUT}=0.1 μF		--	17	--	us
t_F	V_{OUT} Rise Time			--	15	--	

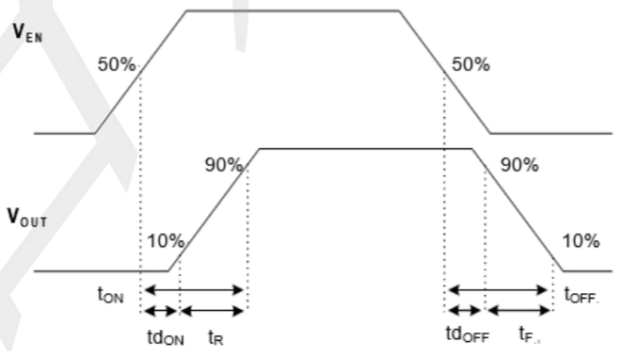
BLOCK DIAGRAM



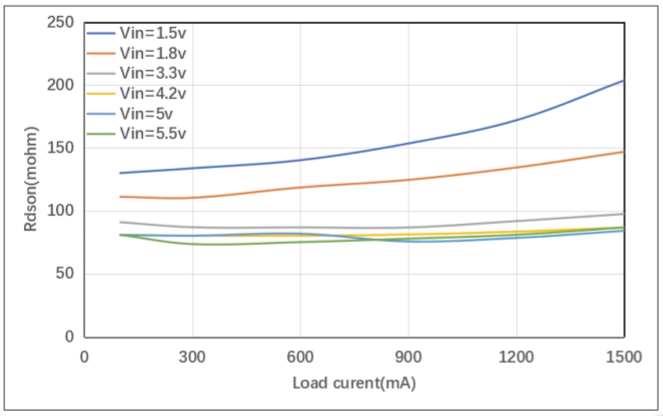
Typical Application Circuit



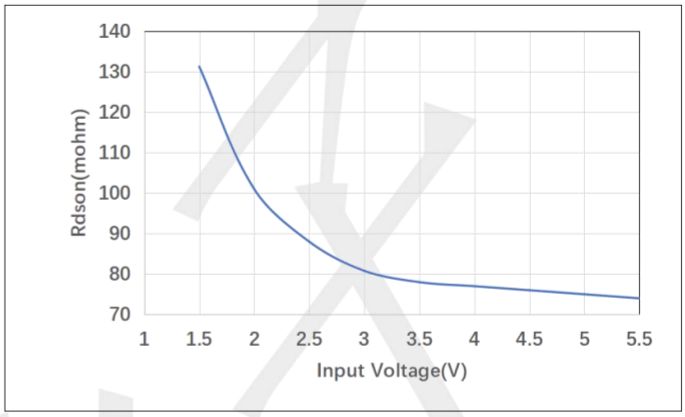
Timing Diagram



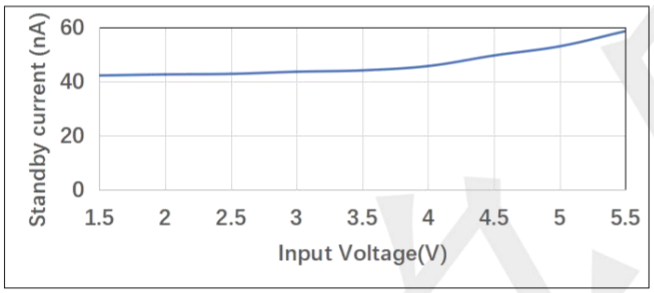
Typical characteristics



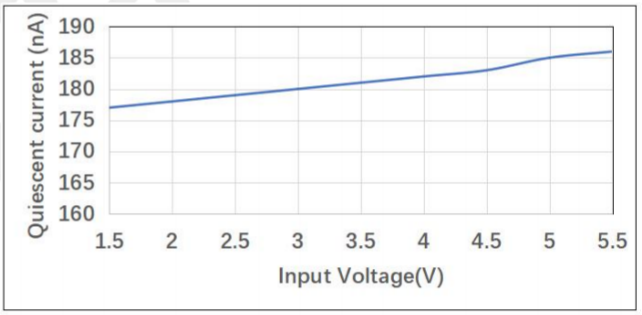
RON vs. Load current (VEN=H)



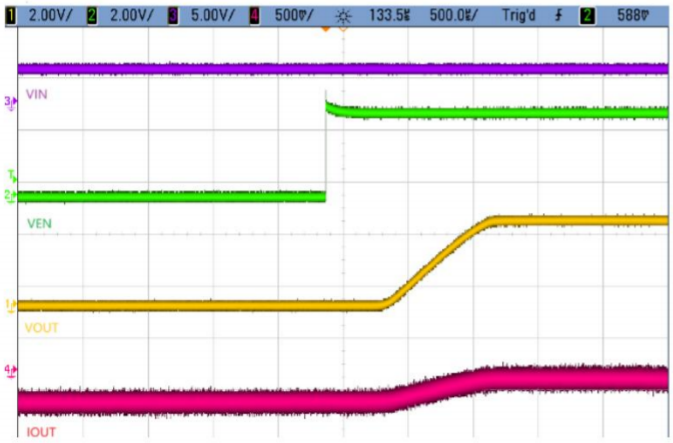
RON vs. VIN (VEN=VIN,ILOAD=200mA)



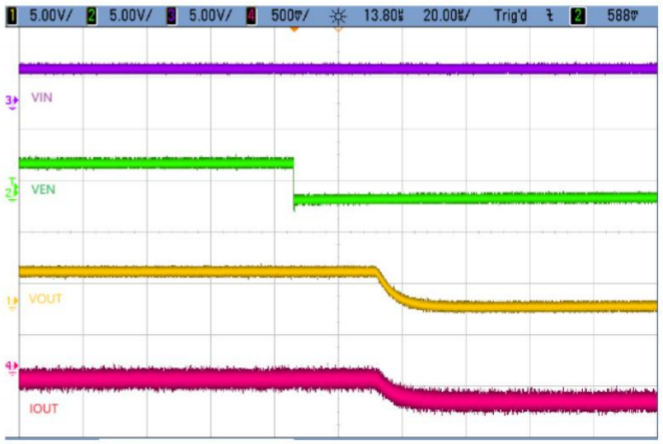
Standby current vs. VIN (VOUT=OPEN)



Quiescent current vs. VIN (VEN=H,NO LOAD)



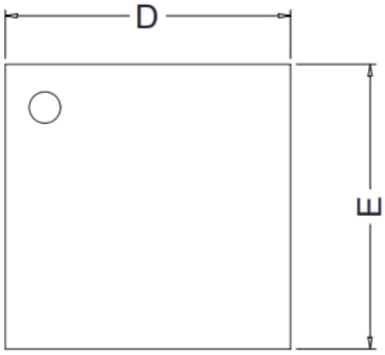
Turn on transient (Cin=1uF,Cout=0.1uF, RLOAD=150Ω,VIN=3.3V



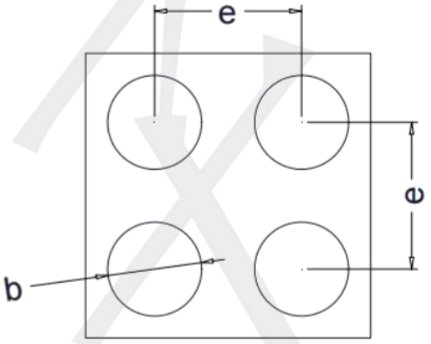
Turn off transient (Cin=1uF,Cout=0.1uF, RLOAD=150Ω,VIN=3.3V)

Package information

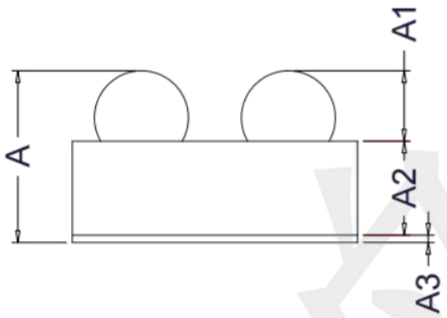
WLCSP-4L



TOP VIEW



BOTTOM VIEW



SIDE VIEW

Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.395	0.445	0.495
A1	0.144	0.160	0.176
A2	0.255	0.285	0.315
A3	0.020	0.025	0.030
D	0.755	0.770	0.785
E	0.755	0.770	0.785
e	0.350	0.400	0.450
b	0.190	0.210	0.230