



Descriptions

The MAX40200ANS+T 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 MAX40200ANS+T 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.

The MAX40200ANS+T is available in CSP-4 package. Standard products are Pb-free and Halogen-free

Features

- Input Voltage Range : 1.5V~5.5V
- Main switch Ron : 32mΩ (VIN=5.5V Typ.)
- Quiescent current : 0.4uA
- Standby current : 80nA
- Maximum Output current : 2A
- Reverse Current Blocking (RCB)
- Controlled Rise Time: 570us at 3.3VIN
- Quick Output Discharge (QOD) : 85Ω(Typ.)
- Compact package: CSP-4

Applications

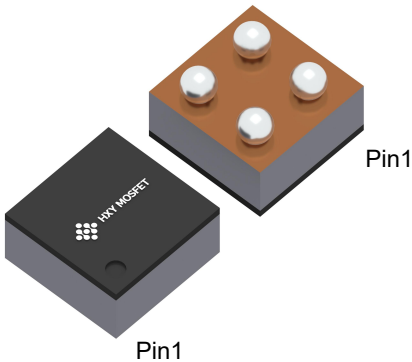
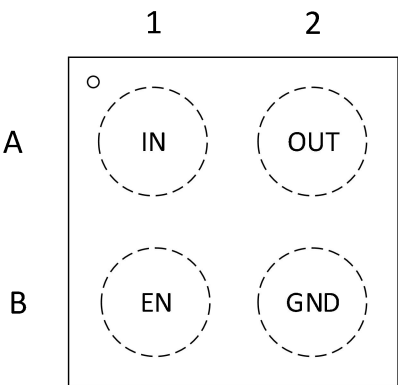
- Wearables
- Smartphones
- Tablets
- Portable Speakers

Order Information

Part Number	Package		Quantity Per Reel
MAX40200ANS+T	CSP-4	Tape and Reel	3000PCS



Pin Information

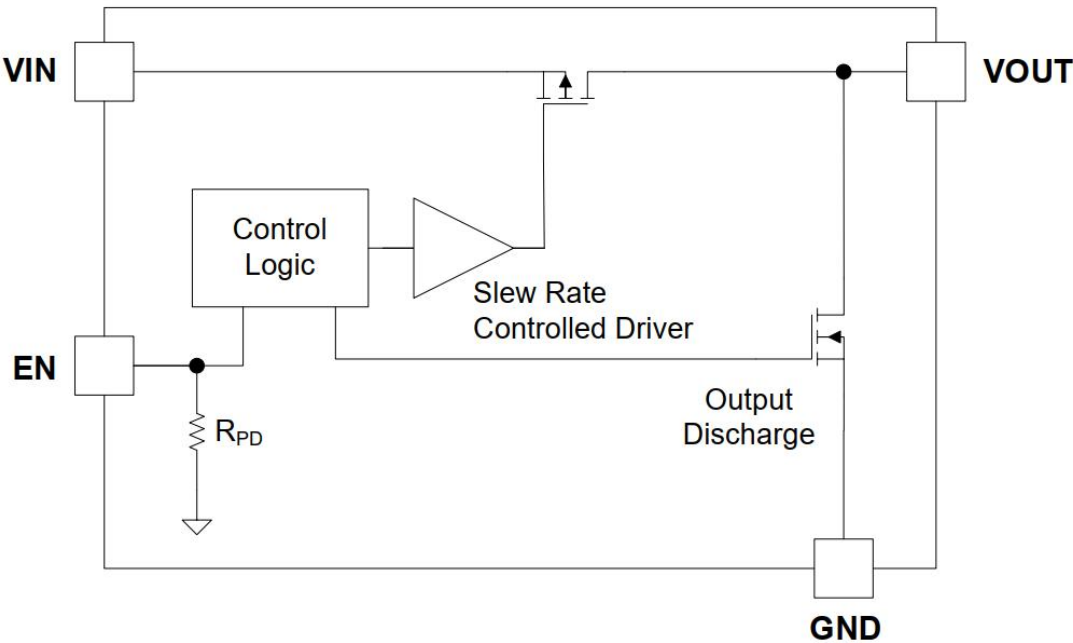


Pin Information (Top-Through View)

CSP-4

Pin	Symbol	Description
A1	IN	Input pin
A2	OUT	Output pin
B1	EN	Enable (Active high)
B2	GND	Ground

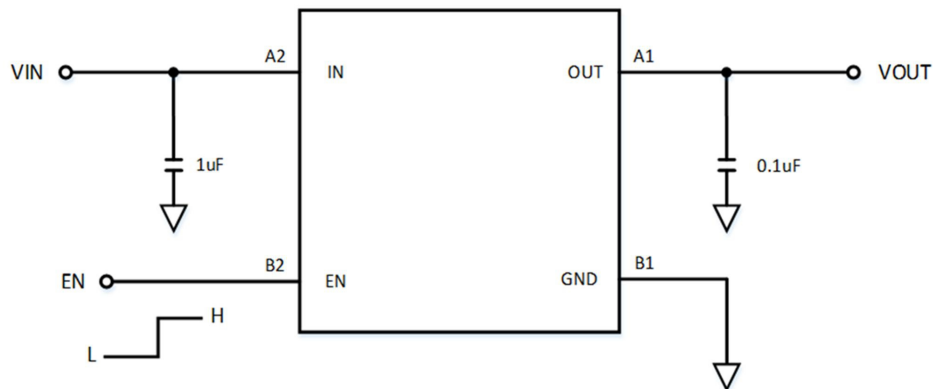
Block Diagram



Block Diagram



Typical Applications



Typical Applications

Absolute Maximum Ratings

The absolute maximum ratings are stress ratings only. Stresses exceeding the range in Table 3 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.

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	°C
Lead Temperature	T_{LEAD}	Soldering, 10 sec.		300	°C
Storage Temperature Range	T_{STG}		-65	150	°C
Human Body Model, JESD22-A114	HBM		4000		V
Charged Device Model, JESD22-C101	CDM		2000		V
MSL			Level 1		

Thermal Information

Parameter	Symbol	Value	Unit
Junction-to-Ambient thermal resistance*1	$R_{\theta JA}$		°C/W

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

Recommend 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	°C
Operating Ambient Temperature	T_A	-40		85	°C



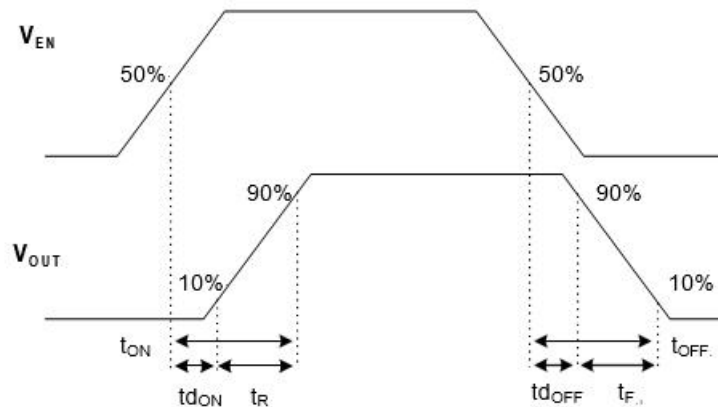
Electrical Characteristics (Ta=25°C, VIN=3.3V unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
IQ	Quiescent Current (1)	EN = Enable, IOUT=0 mA, VIN = VEN =5.5 V		0.4		uA
		EN=Enable, IOUT=0 mA, VIN=VEN=5.5 V, Ta=85 °C		0.7		
ISD	Shut Down Current	EN = Disable, IOUT=0 mA, VIN=1.5 V		65		nA
		EN = Disable, IOUT=0 mA, VIN=3.3 V		70		
		EN = Disable, IOUT=0 mA, VIN=4.2 V		75		
		EN = Disable, IOUT=0 mA, VIN=5.5 V		80		
		EN = Disable, IOUT=0 mA, VIN=5.5 V, Ta=55 °C (5)		140		
RON	On-Resistance	VIN=5.5 V, IOUT= 500 mA	Ta=25 °C	32		mΩ
			Ta=85 °C (5)	36		
		VIN=3.3 V, IOUT= 500 mA	Ta=25 °C	42		
			Ta=85 °C (5)	48		
		VIN=1.8 V, IOUT= 300 mA	Ta=25 °C (5)	72		
		VIN=1.5 V, IOUT= 100 mA	Ta=25 °C	100		
RDSC	Output Discharge Resistance	EN=Low , IFORCE= 10 mA		85		Ω
VIH	EN Input	VIN=1.5-5.5 V	1.2			V
VIL	Logic High Voltage	VIN=1.5-5.5 V			0.4	V
REN	EN pull down resistance	Internal Resistance		10		MΩ
IEN	EN Current	EN=VIN or GND		0.5		uA
VRCB_TH	RCB Protection Threshold Voltage	VOUT – VIN		25		mV
VRCB_RL	RCB Protection Release Voltage	VIN – VOUT		30		mV
tDON	Turn-On Delay (2)	RL=150 Ω, COUT=0.1 μF		430		us
tR	VOUT Rise Time (2)			570		
tDOFF	Turn-On Delay (3), (5)			17		us
tF	VOUT Rise Time (3), (5)			15		

- Notes:
1. IQ does NOT include Enable pull down current through the pull down resistor RPD.
 2. tON = tDON + tR
 3. tOFF = tDOFF + tF
 4. Output discharge path is enabled during off.
 5. By design; characterized, not production tested.

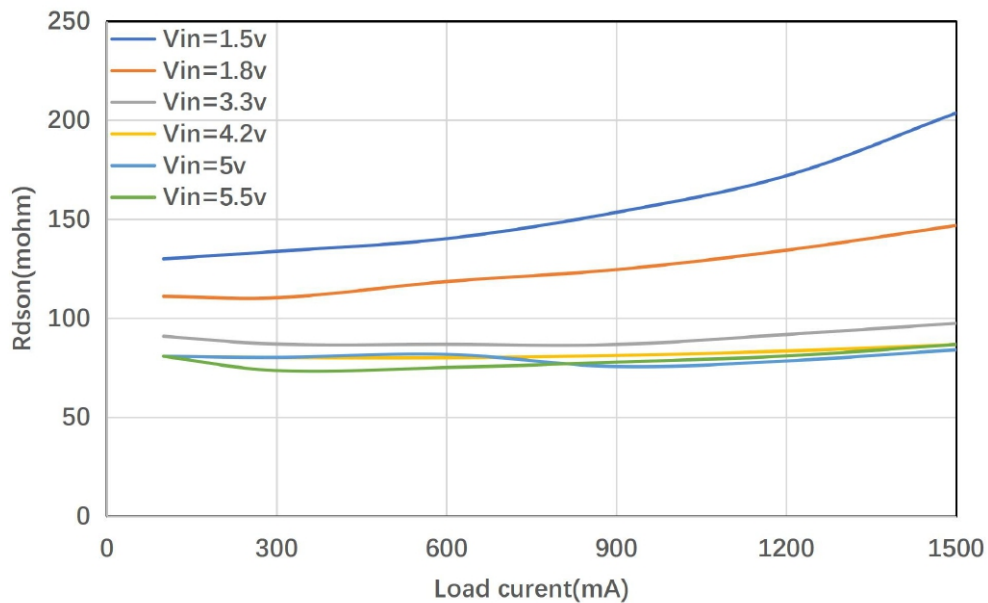


Timing Diagram

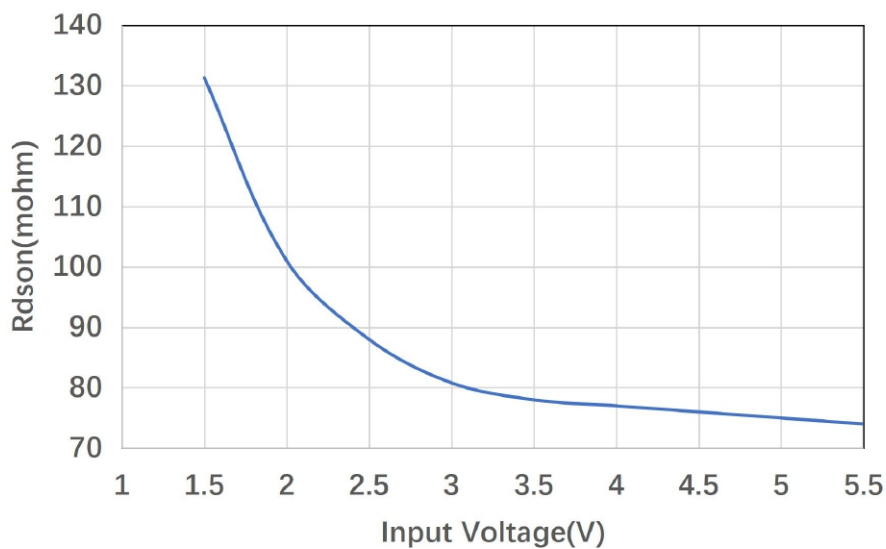


Timing Diagram

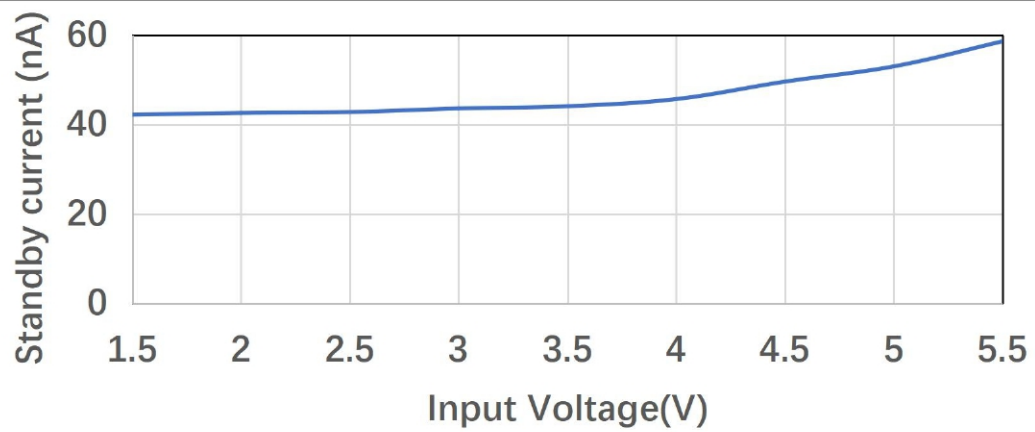
Typical Characteristics ($T_a=25^\circ\text{C}$, $V_{IN}=5\text{V}$, $I_{OUT}=500\text{mA}$, $C_{IN}=1\mu\text{F}$, $C_{OUT}=0.1\mu\text{F}$, unless otherwise noted)



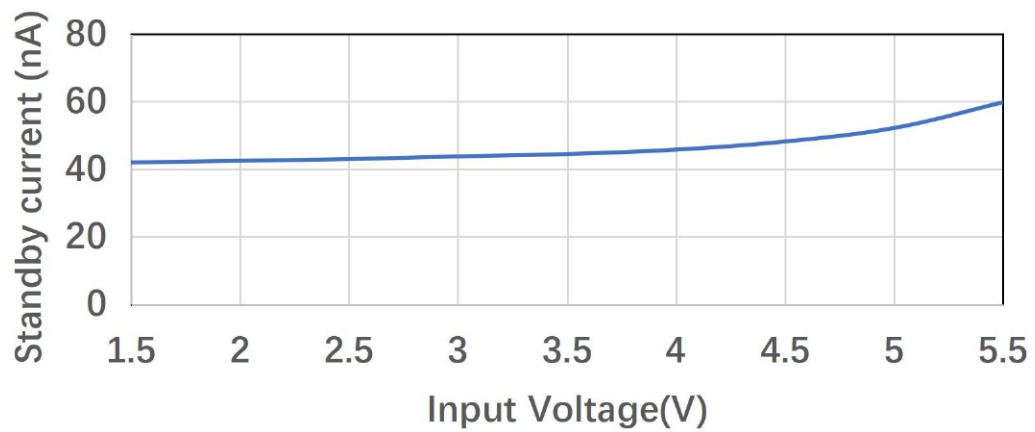
R_{ON} vs. Load current ($V_{EN}=H$)



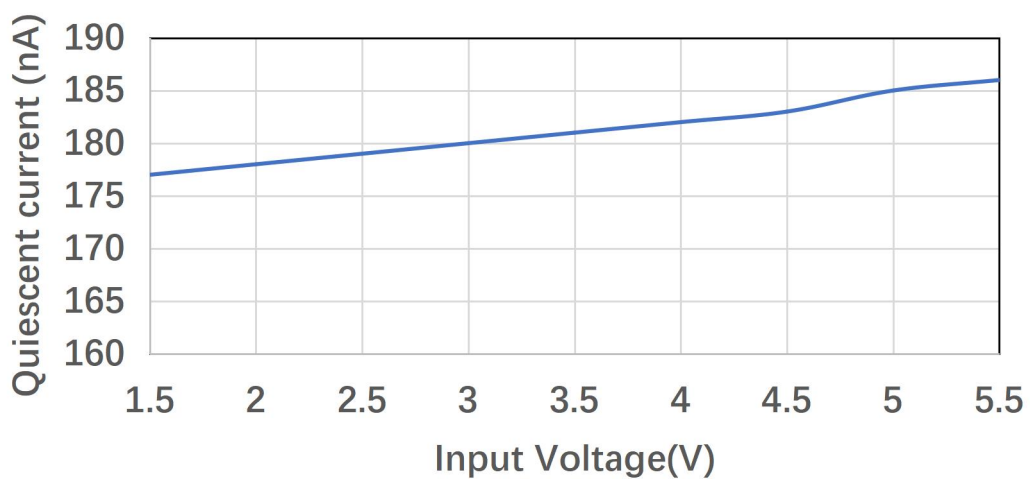
R_{ON} vs. V_{IN} ($V_{EN}=V_{IN}$, $I_{LOAD}=200\text{mA}$)



Standby current vs. V_{IN} (V_{OUT} =OPEN)



Standby current vs. V_{IN} (V_{OUT} =GND)



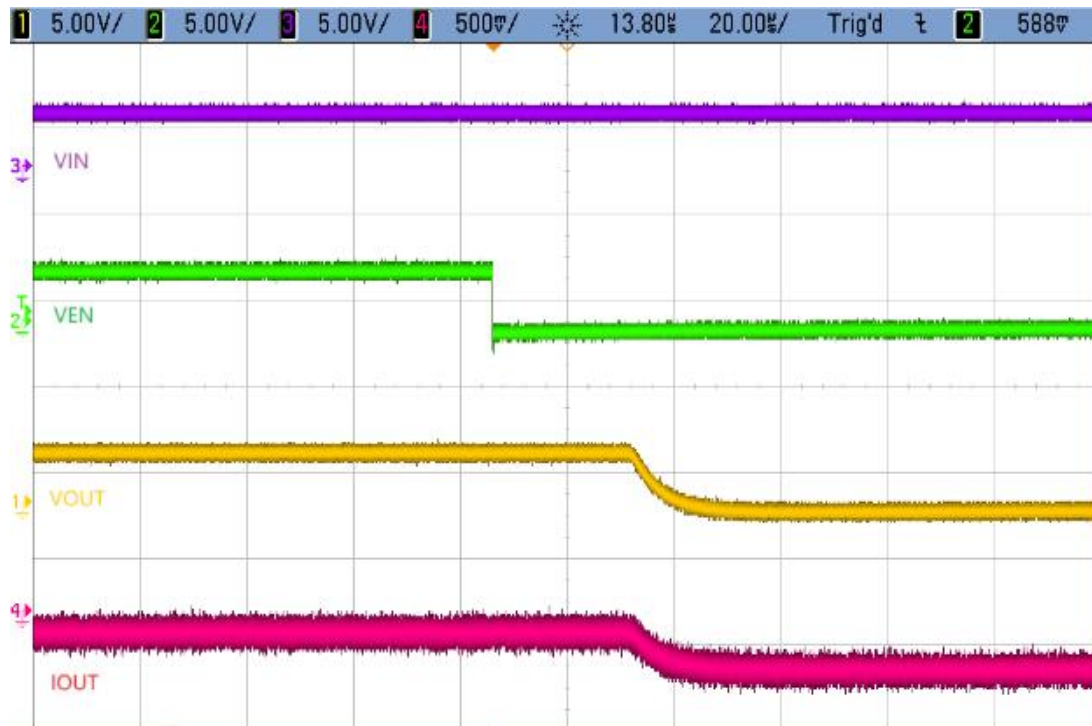
Quiescent current vs. V_{IN} (V_{EN} =H, NO LOAD)



Turn on transient ($C_{in}=1\mu F, C_{out}=0.1\mu F, R_{LOAD}=150\Omega, V_{IN}=3.3V$)



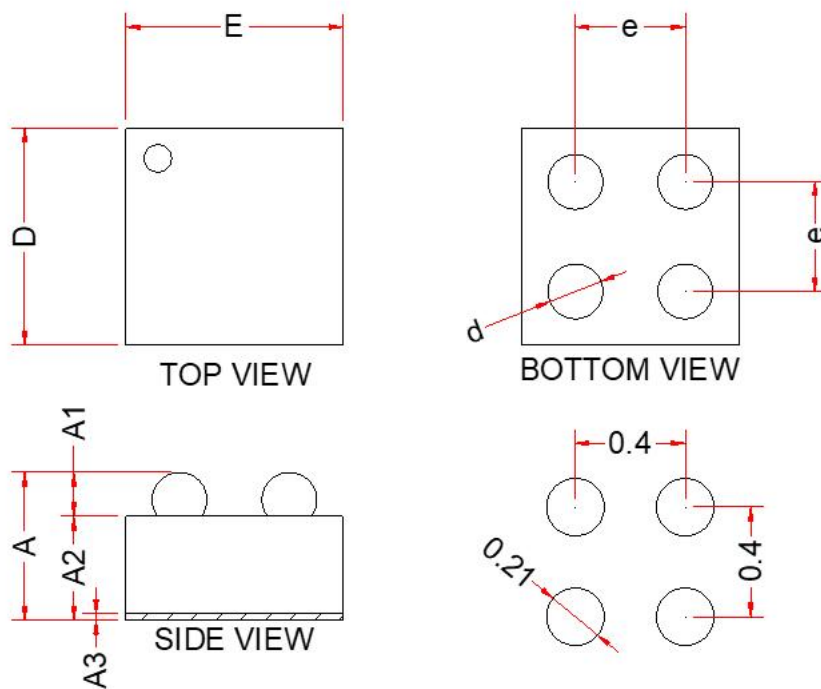
Turn off transient ($C_{in}=1\mu F, C_{out}=0.1\mu F, R_{LOAD}=150\Omega, V_{IN}=3.3V$)





Package Outline Dimensions

CSP-4



RECOMMENDED LAND PATTERN(unit:mm)

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
d	0.190	0.210	0.230



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