USB Charger Emulator with Adjustable Over Current Protection UC2603

DESCRIPTION

The UC2603 is USB charger emulators with over current protection for Smart USB dedicated chargers.

The devices integrated automatic USB charger identification circuit allow mobile power supply, In-Car charger, USB wall adapters, travel chargers, and other dedicated chargers to identify themselves as a USB dedicated charger to USB devices, like Apple charger to Apple products, Samsung charger to Samsung Galaxy Tab & Phone, and BC1.2 charger to Huawei, Xiaomi and other legacy D+/D- short detection devices.

The devices feature an over current protection to protect USB output current, this function can turn off GND when USB output current bigger than setting current and the USB port will auto recovery while the fault condition is removed

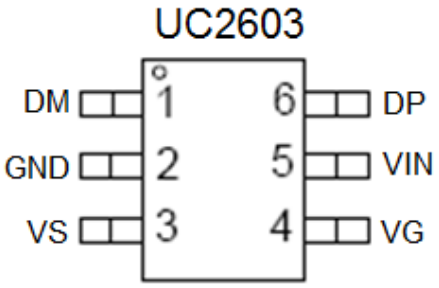
FEATURES

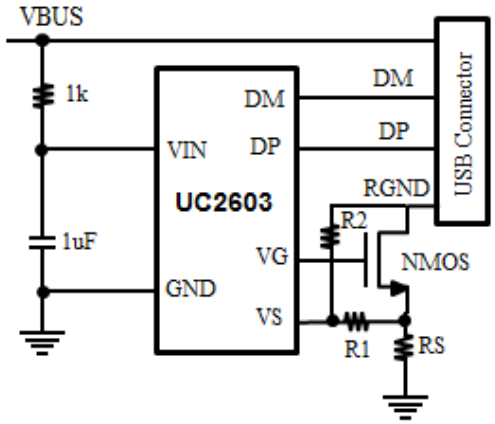
- 4.5V~5.5V Single Supply Operation.
- Easy pass DOE-6 test.
- Adjustable Over Current Protection.
- Support single Layer PCB.
- Automatic USB charger Identification Circuit.
- Support 2.4A Apple® Devices fast charging.
- Support Samsung Galaxy Tab Devices fast Charging.
- Support BC1.2 & YD/T 1591-2009 Charging Spec.
- Available in SOT23-6 Package.

APPLICATIONS

USB Wall Adapter
Travel Charger

UC2603 SOT23-6 PACKAGE and SIMPLIFIED APPLICATION



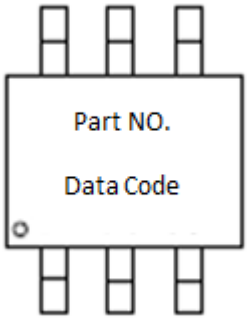


Adjust Over Current Protection by RS,R1,R2

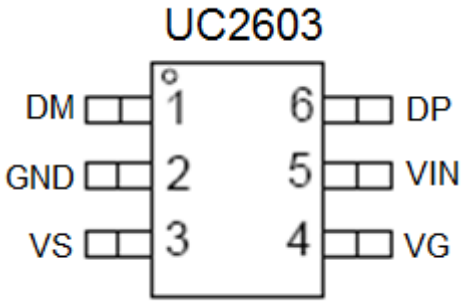
ORDING INFORMATION

Part Number	Package Type	Package Qty	Op Temp(°C)
UC2603	SOT23-6	3000	-40~85

MARK INFORMATION



PINOUT



PIN FUNCTIONS

NO.	NAME	TYPE(1)	DESCRIPTION
1	DM	O/I	DM date line to connector, output for hand-shake voltage to portable equipment, high impedance while disabled
2	GND	G	Ground connection
3	VS	O/I	Sense Voltage
4	VG	O/I	Gate Driver of NMOS
5	IN	P/I	Power supply/Input voltage connected to Power Switch; connect a 1 µF or greater ceramic capacitor from IN to GND as close to the IC as possible
6	DP	O/I	DP data line to connector, input for hand-shake voltage from portable equipment high impedance while disabled

(1) G = Ground, I = Input, O = Output, P = Power

ABSOLUTE MAXIMUM RATINGS (1)

Over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER		MIN	MAX	UNIT
supply voltage range	IN	-0.3	6	V
Input voltage range	DP,DM	-0.3	5.8	
Continuous output sink current	DP input current, DM input current		35	mA
Continuous output source current	DP output current, DM output current		35	
ESD rating, Human Body Model (HBM)	IN		2	kV
	DP, DM, VS,VG		2	
Operating Junction Temperature	T_J	-40	125	°C
Storage Temperature Range	T_{stg}	-65	150	

(1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

THERMAL CHARACTERISTICS

over operating free-air temperature range (unless otherwise noted)

THERMAL METRIC			UNIT
θ_{JA}	Package thermal impedance(1)	180	°C/W

(1) The package thermal impedance is calculated in accordance with JESD 51-7.

RECOMMENDED OPERATING CONDITIONS

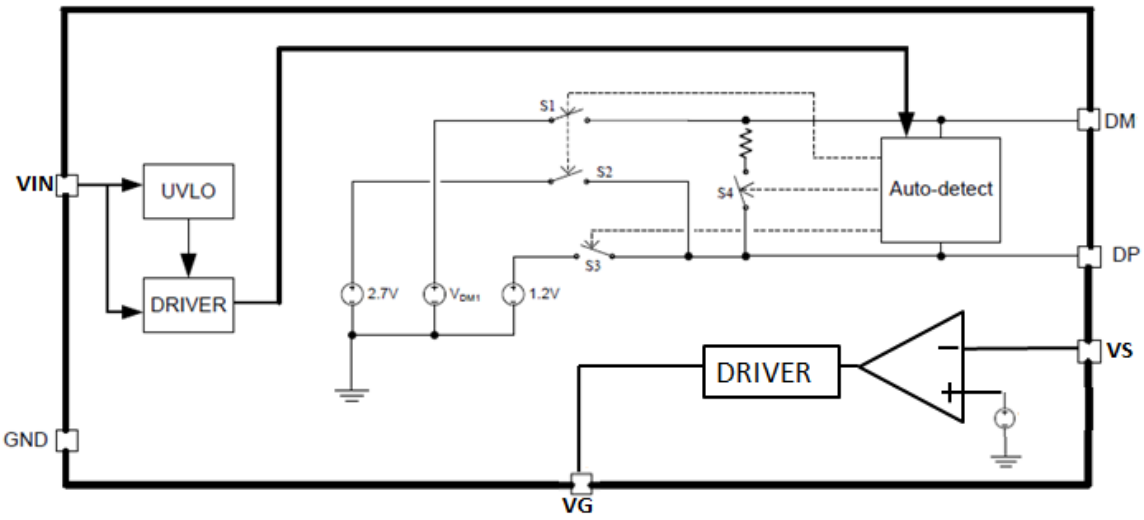
PARAMETER		MIN	MAX	UNIT
V_{IN}	Input voltage of IN	4.5	5.5	V
V_{DP}	DP data line input voltage		5.5	
V_{DM}	DM data line input voltage		5.5	
I_{DP}	Continuous sink/source current		±10	mA
I_{DM}	Continuous sink/source current		±10	
T_J	Operating Junction Temperature	-40	125	°C

ELECTRICAL CHARACTERISTICS

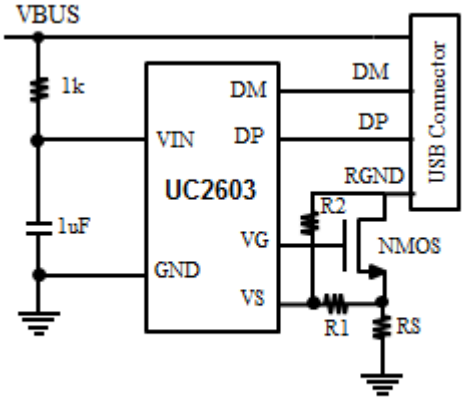
Conditions are **T_A = 25°C and V_{IN} = 5.0 V. All voltages are with respect to GND unless otherwise noted.**

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
UNDERVOLTAGE LOCKOUT						
V_{UVLO}	IN rising UVLO threshold voltage			3.5	3.8	V
	Hysteresis			100		mV
SUPPLY CURRENT						
I_{IN}	IN supply current			160	300	μA
BC 1.2 DCP MODE (SHORT)						
R_{DPM_SHORT}	DP / DM shorting resistance			125	200	Ω
R_{DCHG_SHORT}	Resistors connected DP /DM to GND after hand-shaking			200	400	kΩ
$V_{DPL\_TH\_DETACH}$	DP low threshold while detaching BC1.2 devices			330	360	mV
$V_{DPL\_TH\_DETACH\_HYS}$	hysteresis			50		mV
IPAD MODE 2.4A Mode (SEL=0)						
V_{DP_IPAD}	DP output voltage		2.5	2.7	2.9	V
V_{DM_IPAD}	DM output voltage		2.5	2.7	2.9	V
R_{DP_IPAD}	DP output impedance	I_{DP} = -5uA	20	30	40	kΩ
R_{DM_IPAD}	DM output impedance	I_{DM} = -5uA	20	30	40	kΩ
Galaxy Tab MODE						
V_{DP_GAL}	DP output voltage		1.1	1.2	1.3	V
V_{DM_GAL}	DM output voltage		1.1	1.2	1.3	
R_{DP_GAL}	DP output impedance	I_{DP} = -5uA	70	105	140	kΩ
R_{DM_GAL}	DM output impedance	I_{DM} = -5uA	70	105	140	
Over Current Protection						
I_{VS}	VS Pin Source Current		19	20	21	uA
Vos	Offset Voltage		-1	0	1	mV

BLOCK DIAGRAM



APPLICATION CIRCUIT



Adjust Over Current Protection by RS,R1,R2

Over Current Protection Calculaton:

$$I_{OUT} = \frac{95mV - 20uA \times R_1}{R_S}$$

PACKAGE INFORMATION

SOT23-6