

GENERAL DESCRIPTION

The SGM41100 is designed for primary protection of Li-Ion/polymer rechargeable cells. The product integrates all the protections required for safe operation of polymer rechargeable cells. The device is packaged in a tiny and thin package. Its small solution size leaves more space for fitting the battery cell into a given cavity for small size wearable devices.

The SGM41100 integrates all the protections and the required low on-resistance disconnect switch on one die. The protection features include charge and discharge protection, detection and protection of a cell in charge over-voltage, charge over-current, discharge under-voltage and discharge over-current. The product also disconnects the battery pack in the case of deep discharge.

The SGM41100 operates in -40°C to +85°C temperature range, and is in a thin and low profile UTDFN-1.5×2-6L package. This package with a nominal height of 0.5mm is convenient for small cell packing designs.

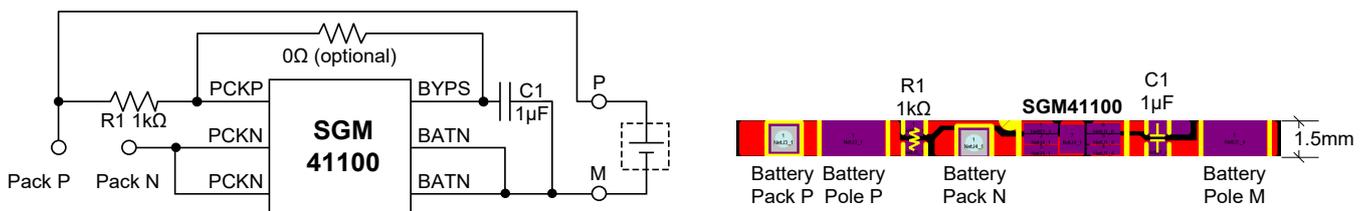
FEATURES

- Ultra-Compact Protection Solution
- Pass Resistance: 44mΩ (TYP)
- Operation Current: 1μA (TYP)
- Factory Programmable OVP Threshold Options
4.20V to 4.55V with 0.05V per Step
- Charge/Discharge Over-Current Protection
4 Thresholds Combination Options
- Battery Under-Voltage Protection
2.4V/2.5V/2.8V/3.0V Options
- 100nA Deep Discharge Shutdown
- Exhausted Battery Charging from 0.2V
- Input Surge Clamping
- Input Over-Voltage Safe
- Load Short-Circuit Safe
- Reverse Polarity Battery Safe
- Input Reversed-Attaching Safe
- Battery Pack Paralleling Safe
- Locked-Off for Delivery/Assembly
- Available in a Green UTDFN-1.5×2-6L Package

APPLICATIONS

- IoT Gadgets
- Wearable Devices
- Battery Packs

TYPICAL APPLICATION



NOTE: The short-circuit of both ends (P and M) of the battery should be avoided during the battery assembly process.

Figure 1. Typical Application Circuit and Demonstration Board Outline

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM41100-420M04	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-420M04YUDT6G/TR	MPF XXX	Tape and Reel, 3000
SGM41100-420M06	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-420M06YUDT6G/TR	MQ0 XXX	Tape and Reel, 3000
SGM41100-420M09	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-420M09YUDT6G/TR	MLF XXX	Tape and Reel, 3000
SGM41100-420M13	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-420M13YUDT6G/TR	MQ1 XXX	Tape and Reel, 3000
SGM41100-420N04	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-420N04YUDT6G/TR	MQ2 XXX	Tape and Reel, 3000
SGM41100-420N06	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-420N06YUDT6G/TR	MQ3 XXX	Tape and Reel, 3000
SGM41100-420N09	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-420N09YUDT6G/TR	MQ4 XXX	Tape and Reel, 3000
SGM41100-420N13	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-420N13YUDT6G/TR	MQ5 XXX	Tape and Reel, 3000
SGM41100-420O04	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-420O04YUDT6G/TR	MQ6 XXX	Tape and Reel, 3000
SGM41100-420O06	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-420O06YUDT6G/TR	MQ7 XXX	Tape and Reel, 3000
SGM41100-420O09	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-420O09YUDT6G/TR	MQ8 XXX	Tape and Reel, 3000
SGM41100-420O13	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-420O13YUDT6G/TR	MQ9 XXX	Tape and Reel, 3000
SGM41100-420P04	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-420P04YUDT6G/TR	MQA XXX	Tape and Reel, 3000
SGM41100-420P06	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-420P06YUDT6G/TR	MQB XXX	Tape and Reel, 3000
SGM41100-420P09	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-420P09YUDT6G/TR	MQC XXX	Tape and Reel, 3000
SGM41100-420P13	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-420P13YUDT6G/TR	MQD XXX	Tape and Reel, 3000
SGM41100-425M04	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-425M04YUDT6G/TR	MQE XXX	Tape and Reel, 3000
SGM41100-425M06	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-425M06YUDT6G/TR	MQF XXX	Tape and Reel, 3000
SGM41100-425M09	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-425M09YUDT6G/TR	MR0 XXX	Tape and Reel, 3000
SGM41100-425M13	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-425M13YUDT6G/TR	MR1 XXX	Tape and Reel, 3000
SGM41100-425N04	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-425N04YUDT6G/TR	MR2 XXX	Tape and Reel, 3000
SGM41100-425N06	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-425N06YUDT6G/TR	MR3 XXX	Tape and Reel, 3000
SGM41100-425N09	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-425N09YUDT6G/TR	MR4 XXX	Tape and Reel, 3000
SGM41100-425N13	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-425N13YUDT6G/TR	MR5 XXX	Tape and Reel, 3000
SGM41100-425O04	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-425O04YUDT6G/TR	MR6 XXX	Tape and Reel, 3000
SGM41100-425O06	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-425O06YUDT6G/TR	MR7 XXX	Tape and Reel, 3000

SGM41100

True Monolithic Li-Ion/Polymer Battery Protector in Tiny Thin Package

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM41100-425O09	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-425O09YUDT6G/TR	MR8 XXX	Tape and Reel, 3000
SGM41100-425O13	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-425O13YUDT6G/TR	MR9 XXX	Tape and Reel, 3000
SGM41100-425P04	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-425P04YUDT6G/TR	MD7 XXX	Tape and Reel, 3000
SGM41100-425P06	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-425P06YUDT6G/TR	MHF XXX	Tape and Reel, 3000
SGM41100-425P09	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-425P09YUDT6G/TR	MRA XXX	Tape and Reel, 3000
SGM41100-425P13	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-425P13YUDT6G/TR	MPD XXX	Tape and Reel, 3000
SGM41100-430M04	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-430M04YUDT6G/TR	MRB XXX	Tape and Reel, 3000
SGM41100-430M06	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-430M06YUDT6G/TR	MRC XXX	Tape and Reel, 3000
SGM41100-430M09	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-430M09YUDT6G/TR	MRD XXX	Tape and Reel, 3000
SGM41100-430M13	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-430M13YUDT6G/TR	MRE XXX	Tape and Reel, 3000
SGM41100-430N04	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-430N04YUDT6G/TR	MRF XXX	Tape and Reel, 3000
SGM41100-430N06	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-430N06YUDT6G/TR	MS0 XXX	Tape and Reel, 3000
SGM41100-430N09	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-430N09YUDT6G/TR	MS1 XXX	Tape and Reel, 3000
SGM41100-430N13	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-430N13YUDT6G/TR	MHD XXX	Tape and Reel, 3000
SGM41100-430O04	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-430O04YUDT6G/TR	MI5 XXX	Tape and Reel, 3000
SGM41100-430O06	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-430O06YUDT6G/TR	MS2 XXX	Tape and Reel, 3000
SGM41100-430O09	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-430O09YUDT6G/TR	MS3 XXX	Tape and Reel, 3000
SGM41100-430O13	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-430O13YUDT6G/TR	MS4 XXX	Tape and Reel, 3000
SGM41100-430P04	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-430P04YUDT6G/TR	MD8 XXX	Tape and Reel, 3000
SGM41100-430P06	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-430P06YUDT6G/TR	MI1 XXX	Tape and Reel, 3000
SGM41100-430P09	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-430P09YUDT6G/TR	MS5 XXX	Tape and Reel, 3000
SGM41100-430P13	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-430P13YUDT6G/TR	MS6 XXX	Tape and Reel, 3000
SGM41100-435M04	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-435M04YUDT6G/TR	MS7 XXX	Tape and Reel, 3000
SGM41100-435M06	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-435M06YUDT6G/TR	MS8 XXX	Tape and Reel, 3000
SGM41100-435M09	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-435M09YUDT6G/TR	MS9 XXX	Tape and Reel, 3000
SGM41100-435M13	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-435M13YUDT6G/TR	MSA XXX	Tape and Reel, 3000
SGM41100-435N04	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-435N04YUDT6G/TR	MSB XXX	Tape and Reel, 3000

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MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM41100-435N06	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-435N06YUDT6G/TR	MSC XXX	Tape and Reel, 3000
SGM41100-435N09	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-435N09YUDT6G/TR	MSD XXX	Tape and Reel, 3000
SGM41100-435N13	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-435N13YUDT6G/TR	MSE XXX	Tape and Reel, 3000
SGM41100-435O04	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-435O04YUDT6G/TR	MI4 XXX	Tape and Reel, 3000
SGM41100-435O06	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-435O06YUDT6G/TR	MSF XXX	Tape and Reel, 3000
SGM41100-435O09	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-435O09YUDT6G/TR	MT0 XXX	Tape and Reel, 3000
SGM41100-435O13	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-435O13YUDT6G/TR	MT1 XXX	Tape and Reel, 3000
SGM41100-435P04	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-435P04YUDT6G/TR	M95 XXX	Tape and Reel, 3000
SGM41100-435P06	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-435P06YUDT6G/TR	MI0 XXX	Tape and Reel, 3000
SGM41100-435P09	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-435P09YUDT6G/TR	MT2 XXX	Tape and Reel, 3000
SGM41100-435P13	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-435P13YUDT6G/TR	MI3 XXX	Tape and Reel, 3000
SGM41100-440M04	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-440M04YUDT6G/TR	MT3 XXX	Tape and Reel, 3000
SGM41100-440M06	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-440M06YUDT6G/TR	MT4 XXX	Tape and Reel, 3000
SGM41100-440M09	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-440M09YUDT6G/TR	MT5 XXX	Tape and Reel, 3000
SGM41100-440M13	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-440M13YUDT6G/TR	MT6 XXX	Tape and Reel, 3000
SGM41100-440N04	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-440N04YUDT6G/TR	MT7 XXX	Tape and Reel, 3000
SGM41100-440N06	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-440N06YUDT6G/TR	MT8 XXX	Tape and Reel, 3000
SGM41100-440N09	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-440N09YUDT6G/TR	MT9 XXX	Tape and Reel, 3000
SGM41100-440N13	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-440N13YUDT6G/TR	MTA XXX	Tape and Reel, 3000
SGM41100-440O04	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-440O04YUDT6G/TR	MH5 XXX	Tape and Reel, 3000
SGM41100-440O06	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-440O06YUDT6G/TR	MTB XXX	Tape and Reel, 3000
SGM41100-440O09	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-440O09YUDT6G/TR	MTC XXX	Tape and Reel, 3000
SGM41100-440O13	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-440O13YUDT6G/TR	MTD XXX	Tape and Reel, 3000
SGM41100-440P04	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-440P04YUDT6G/TR	MTE XXX	Tape and Reel, 3000
SGM41100-440P06	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-440P06YUDT6G/TR	MTF XXX	Tape and Reel, 3000
SGM41100-440P09	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-440P09YUDT6G/TR	MU0 XXX	Tape and Reel, 3000
SGM41100-440P13	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-440P13YUDT6G/TR	MU1 XXX	Tape and Reel, 3000

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MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM41100-445M04	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-445M04YUDT6G/TR	MU2 XXX	Tape and Reel, 3000
SGM41100-445M06	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-445M06YUDT6G/TR	MU3 XXX	Tape and Reel, 3000
SGM41100-445M09	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-445M09YUDT6G/TR	MU4 XXX	Tape and Reel, 3000
SGM41100-445M13	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-445M13YUDT6G/TR	MU5 XXX	Tape and Reel, 3000
SGM41100-445N04	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-445N04YUDT6G/TR	MU6 XXX	Tape and Reel, 3000
SGM41100-445N06	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-445N06YUDT6G/TR	MU7 XXX	Tape and Reel, 3000
SGM41100-445N09	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-445N09YUDT6G/TR	MU8 XXX	Tape and Reel, 3000
SGM41100-445N13	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-445N13YUDT6G/TR	MU9 XXX	Tape and Reel, 3000
SGM41100-445O04	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-445O04YUDT6G/TR	MHE XXX	Tape and Reel, 3000
SGM41100-445O06	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-445O06YUDT6G/TR	MUA XXX	Tape and Reel, 3000
SGM41100-445O09	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-445O09YUDT6G/TR	MUB XXX	Tape and Reel, 3000
SGM41100-445O13	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-445O13YUDT6G/TR	MUC XXX	Tape and Reel, 3000
SGM41100-445P04	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-445P04YUDT6G/TR	MD9 XXX	Tape and Reel, 3000
SGM41100-445P06	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-445P06YUDT6G/TR	MUD XXX	Tape and Reel, 3000
SGM41100-445P09	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-445P09YUDT6G/TR	MUE XXX	Tape and Reel, 3000
SGM41100-445P13	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-445P13YUDT6G/TR	MI2 XXX	Tape and Reel, 3000
SGM41100-450M04	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-450M04YUDT6G/TR	MUF XXX	Tape and Reel, 3000
SGM41100-450M06	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-450M06YUDT6G/TR	MV0 XXX	Tape and Reel, 3000
SGM41100-450M09	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-450M09YUDT6G/TR	MM0 XXX	Tape and Reel, 3000
SGM41100-450M13	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-450M13YUDT6G/TR	MV1 XXX	Tape and Reel, 3000
SGM41100-450N04	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-450N04YUDT6G/TR	MV2 XXX	Tape and Reel, 3000
SGM41100-450N06	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-450N06YUDT6G/TR	MV3 XXX	Tape and Reel, 3000
SGM41100-450N09	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-450N09YUDT6G/TR	MV4 XXX	Tape and Reel, 3000
SGM41100-450N13	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-450N13YUDT6G/TR	MV5 XXX	Tape and Reel, 3000
SGM41100-450O04	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-450O04YUDT6G/TR	MV6 XXX	Tape and Reel, 3000
SGM41100-450O06	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-450O06YUDT6G/TR	MV7 XXX	Tape and Reel, 3000
SGM41100-450O09	UTDFN-1.5×2-6L	-40°C to +85°C	SGM41100-450O09YUDT6G/TR	MV8 XXX	Tape and Reel, 3000

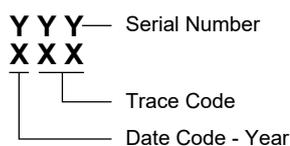
SGM41100

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MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM41100-450O13	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-450O13YUDT6G/TR	MV9 XXX	Tape and Reel, 3000
SGM41100-450P04	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-450P04YUDT6G/TR	MVA XXX	Tape and Reel, 3000
SGM41100-450P06	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-450P06YUDT6G/TR	MVB XXX	Tape and Reel, 3000
SGM41100-450P09	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-450P09YUDT6G/TR	MVC XXX	Tape and Reel, 3000
SGM41100-450P13	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-450P13YUDT6G/TR	MVD XXX	Tape and Reel, 3000
SGM41100-455M04	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-455M04YUDT6G/TR	MVE XXX	Tape and Reel, 3000
SGM41100-455M06	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-455M06YUDT6G/TR	MVF XXX	Tape and Reel, 3000
SGM41100-455M09	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-455M09YUDT6G/TR	MW0 XXX	Tape and Reel, 3000
SGM41100-455M13	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-455M13YUDT6G/TR	MW1 XXX	Tape and Reel, 3000
SGM41100-455N04	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-455N04YUDT6G/TR	MW2 XXX	Tape and Reel, 3000
SGM41100-455N06	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-455N06YUDT6G/TR	MW3 XXX	Tape and Reel, 3000
SGM41100-455N09	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-455N09YUDT6G/TR	MM1 XXX	Tape and Reel, 3000
SGM41100-455N13	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-455N13YUDT6G/TR	MW4 XXX	Tape and Reel, 3000
SGM41100-455O04	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-455O04YUDT6G/TR	MW5 XXX	Tape and Reel, 3000
SGM41100-455O06	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-455O06YUDT6G/TR	MW6 XXX	Tape and Reel, 3000
SGM41100-455O09	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-455O09YUDT6G/TR	MW7 XXX	Tape and Reel, 3000
SGM41100-455O13	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-455O13YUDT6G/TR	MW8 XXX	Tape and Reel, 3000
SGM41100-455P04	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-455P04YUDT6G/TR	MW9 XXX	Tape and Reel, 3000
SGM41100-455P06	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-455P06YUDT6G/TR	MWA XXX	Tape and Reel, 3000
SGM41100-455P09	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-455P09YUDT6G/TR	MWB XXX	Tape and Reel, 3000
SGM41100-455P13	UTDFN-1.5x2-6L	-40°C to +85°C	SGM41100-455P13YUDT6G/TR	MWC XXX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XXX = Date Code and Trace Code.



Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

DEVICE DESCRIPTION

Model: SGM41100-AAABCC

Over-Voltage Threshold Options								
Option Code "AAA"	420	425	430	435	440	445	450	455
Over-Voltage Threshold V_{OV} (V)	4.20	4.25	4.30	4.35	4.40	4.45	4.50	4.55
Under-Voltage Threshold Options								
Option Code "B"	M		N		O		P	
Under-Voltage Threshold V_{UV} (V)	2.4		2.5		2.8		3.0	
Current Threshold Combination Options								
Option Code "CC"	04		06		09		13	
Charge Over-Current I_{OC} (A)	0.35		0.51		0.76		1.12	
Discharge Over-Current I_{OD} (A)	0.43		0.61		0.91		1.33	
Short-Circuit Current (A)	3×0.43		3×0.61		3×0.91		2×1.33	

ABSOLUTE MAXIMUM RATINGS

PCKP to PCKN, 13V ⁽¹⁾ , 10mA Clamping ⁽²⁾	5s
PCKP to PCKN.....	-4.5V or +9V ⁽³⁾ , Continuous
PCKP to BATN.....	-4.5V ⁽³⁾ or +5.5V
PCKP to PCKN Short-Circuit ⁽⁴⁾	Continuous
PCKP to PCKN Attachment Inrush/Outrush ⁽⁵⁾	+9V/-4.5V
PCKP to BATN Attachment Inrush/Outrush ⁽⁶⁾	±4.5V
Surge Current ⁽⁷⁾	±20A
Junction Temperature.....	+150°C
Storage Temperature Range.....	-65°C to +150°C
Lead Temperature (Soldering, 10s).....	+260°C
ESD Susceptibility	
HBM.....	2000V
MM.....	200V
CDM.....	1000V

NOTES:

1. Evaluation at V_{BAT} = 4.5V.
2. The clamping may reach 10mA at an input voltage > 13V.
3. Test with a voltage regulated supply that has 2A current limit and increase the voltage progressively for less than 1V/ms slope rate. Apply a voltage to the device under test from 0V to given voltages.
4. The device is tested after being installed on the circuit board in Figure 1. Clip a 4.5V 5A power source onto the P and M to simulate a battery and short the Pack P and the Pack N with an 80mΩ wire.
5. The device is tested after being installed on the circuit board in Figure 1. Connect a 3.2V supply and 2A sinking resistor R_{SINK} as showed in Figure 2 to the P and M for inrush test. Clip a 4.5V 5A supply for outrush test.
6. The device is tested after being installed on the circuit board in Figure 1 with the circuit in Figure 3.
7. Parallel or connect in reverse polarity two battery packs of Figure 1. Limit the battery pack impedance to limit the surge current to 20A.

RECOMMENDED OPERATING CONDITIONS

Supply Voltage Range.....	0V to 6V
Battery Voltage Range.....	0 to 4.5V
Junction Temperature Range.....	-40°C to +85°C

OVERSTRESS CAUTION

Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

ESD SENSITIVITY CAUTION

This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because even small parametric changes could cause the device not to meet the published specifications.

DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

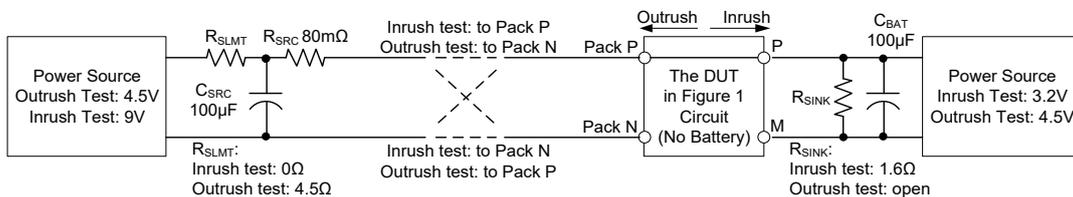


Figure 2. Test Set-Up for Pack P to Pack N Attachment Inrush/Outrush

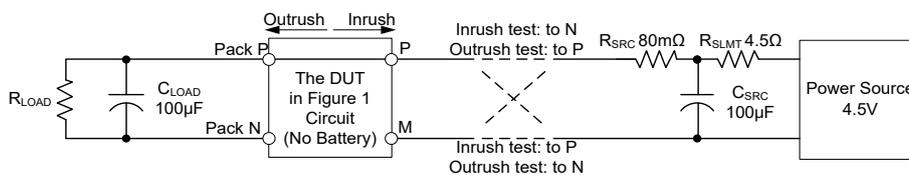
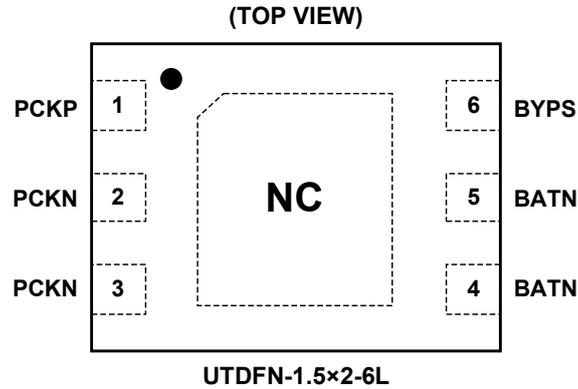


Figure 3. Test Set-Up for Pack P to BATN Attachment Inrush/Outrush

PIN CONFIGURATION



PIN DESCRIPTION

PIN	NAME	TYPE	FUNCTION
1	PCKP	P	Power Input and Output, the Battery Pack Positive Connection. The default state after battery attached is closed or locked-off, dependent on the external circuitry. Connect a 200nF capacitor between PCKN pin and BATN pin for setting the default state to closed. It is recommended to connect a 0Ω resistor between PCKP pin and BYPS pin for suppressing noise applied to the PCKP input.
2, 3	PCKN	P	Power Input and Output, the Battery Pack Cathode. Short this pin to BATN pin to release off the locked-open state, and make the output path closed.
4, 5	BATN	G	Ground of Internal Circuit. Connect to the battery cathode end.
6	BYPS	I/O	Bypass Pin and Disconnection Locked-Off Triggering Input. Place a 1μF capacitor between this pin and BATN pin. Shorting this pin to PCKN pin momentarily places the circuit into locked-open state.
Exposed Pad	NC	NC	Not Connected Internally. Can be connected to BATN or PCKN if needed.

NOTE: I/O = Input or Output, G = Ground, P = Power for the Circuit, NC = Not Connected.

ELECTRICAL CHARACTERISTICS

(T_J = +25°C, I_{CHG} = I_{DIS} = 200mA, V_{BAT} = 3.7V, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS		
Charge Over-Voltage Threshold	V _{OV}	SGM41100-420_ _ _	T _J = +25°C	4.165	4.200	4.235		
			T _J = -20°C to +55°C	4.152		4.248		
			T _J = -40°C to +85°C	4.100		4.300		
		SGM41100-425_ _ _	T _J = +25°C	4.215	4.250	4.285		
			T _J = -20°C to +55°C	4.202		4.298		
			T _J = -40°C to +85°C	4.150		4.350		
		SGM41100-430_ _ _	T _J = +25°C	4.265	4.300	4.335		
			T _J = -20°C to +55°C	4.252		4.348		
			T _J = -40°C to +85°C	4.200		4.400		
		SGM41100-435_ _ _	T _J = +25°C	4.315	4.350	4.385		
			T _J = -20°C to +55°C	4.302		4.398		
			T _J = -40°C to +85°C	4.250		4.450		
		SGM41100-440_ _ _	T _J = +25°C	4.365	4.400	4.435		
			T _J = -20°C to +55°C	4.352		4.448		
			T _J = -40°C to +85°C	4.300		4.500		
		SGM41100-445_ _ _	T _J = +25°C	4.415	4.450	4.485		
			T _J = -20°C to +55°C	4.402		4.498		
			T _J = -40°C to +85°C	4.350		4.550		
		SGM41100-450_ _ _	T _J = +25°C	4.465	4.500	4.535		
			T _J = -20°C to +55°C	4.452		4.548		
			T _J = -40°C to +85°C	4.400		4.600		
		SGM41100-455_ _ _	T _J = +25°C	4.515	4.550	4.585		
			T _J = -20°C to +55°C	4.502		4.598		
			T _J = -40°C to +85°C	4.450		4.650		
		OV Release Hysteresis	V _{OVHYS}	Charger voltage lower than battery voltage		100		mV
		Battery Under-Voltage Threshold	V _{UV}	SGM41100- _ _ _ M _ _	T _J = +25°C	2.362	2.400	2.438
					T _J = -20°C to +55°C	2.350		2.450
T _J = -40°C to +85°C	2.290				2.510			
SGM41100- _ _ _ N _ _	T _J = +25°C			2.462	2.500	2.538		
	T _J = -20°C to +55°C			2.450		2.550		
	T _J = -40°C to +85°C			2.390		2.610		
SGM41100- _ _ _ O _ _	T _J = +25°C			2.762	2.800	2.838		
	T _J = -20°C to +55°C			2.750		2.850		
	T _J = -40°C to +85°C			2.690		2.910		
SGM41100- _ _ _ P _ _	T _J = +25°C			2.962	3.000	3.038		
	T _J = -20°C to +55°C			2.950		3.050		
	T _J = -40°C to +85°C			2.890		3.110		
UV Release Hysteresis	V _{UVHYS}	When a charging supply is applied		100		mV		
Shutdown Voltage	V _{SHDN}	T _J = +25°C	1.40	1.67	1.87	V		
		T _J = -40°C to +85°C	1.15		2.10			

ELECTRICAL CHARACTERISTICS (continued)

(T_J = +25°C, I_{CHG} = I_{DIS} = 200mA, V_{BAT} = 3.7V, unless otherwise noted.)

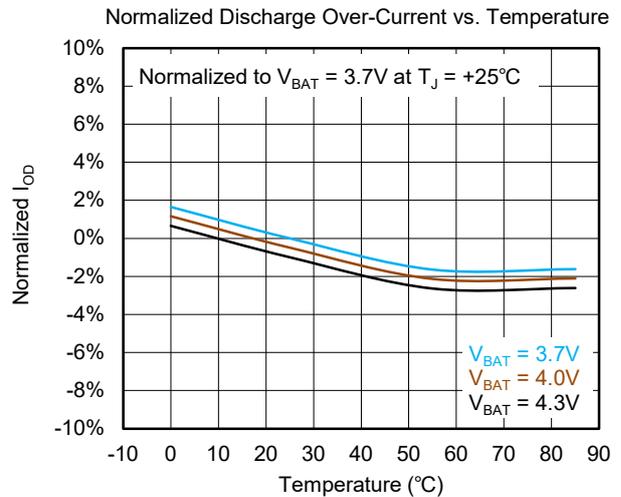
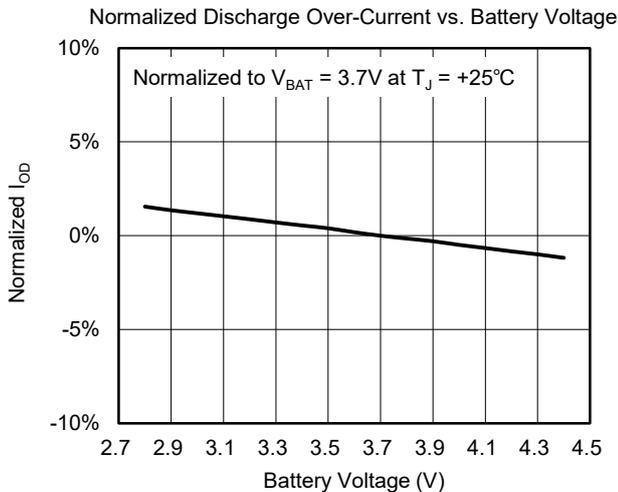
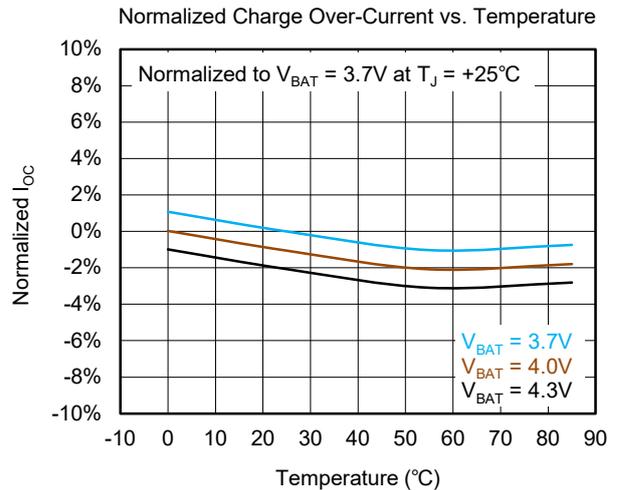
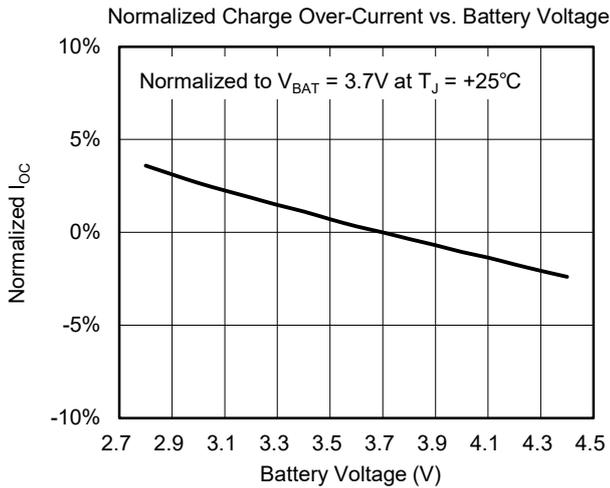
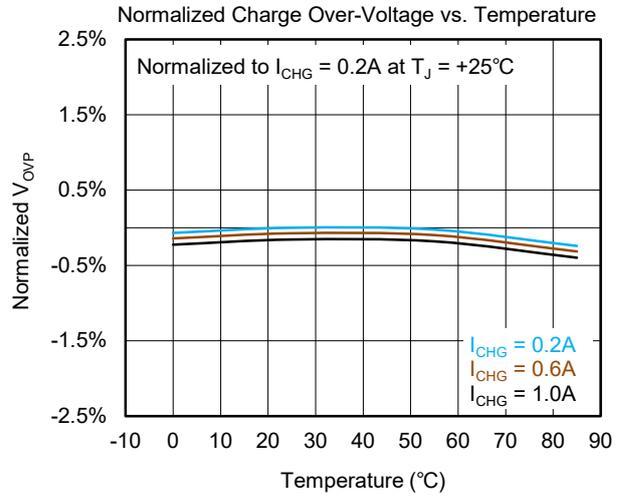
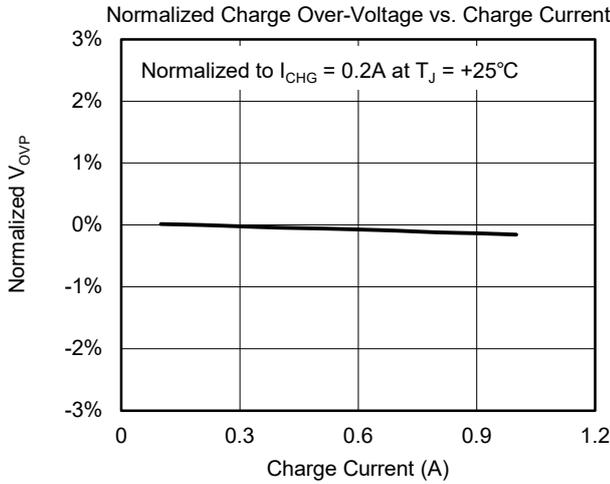
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Discharge Over-Current	I _{OD}	SGM41100-____04	T _J = +25°C	0.31	0.43	0.56
			T _J = -40°C to +85°C	0.26		0.61
		SGM41100-____06	T _J = +25°C	0.46	0.61	0.76
			T _J = -40°C to +85°C	0.38		0.84
		SGM41100-____09	T _J = +25°C	0.70	0.91	1.12
			T _J = -40°C to +85°C	0.61		1.21
		SGM41100-____13	T _J = +25°C	1.03	1.33	1.63
			T _J = -40°C to +85°C	0.92		1.73
Charge Over-Current	I _{OC}	SGM41100-____04	T _J = +25°C	0.23	0.35	0.47
			T _J = -40°C to +85°C	0.19		0.51
		SGM41100-____06	T _J = +25°C	0.35	0.51	0.67
			T _J = -40°C to +85°C	0.30		0.72
		SGM41100-____09	T _J = +25°C	0.54	0.76	0.99
			T _J = -40°C to +85°C	0.49		1.04
		SGM41100-____13	T _J = +25°C	0.80	1.12	1.44
			T _J = -40°C to +85°C	0.74		1.50
Pass Resistance	R _P	T _J = +25°C		44	50	mΩ
		T _J = -40°C to +85°C			62	
Operating Current	I _{OP}	T _J = +25°C		1.0	1.3	μA
		T _J = -40°C to +85°C			1.7	
Shutdown Current	I _{SHDN}	The stable current when the device is in any shutdown condition including that of voltage lower than V _{SHDN} , of lower than V _{UV} and of latch-off.			0.1	μA
Over-Voltage Detection Delay ⁽¹⁾	t _{OVPD}	T _J = +25°C	923	1066	1209	ms
		T _J = -40°C to +85°C	537		1342	
Under-Voltage Detection Delay ⁽¹⁾	t _{UVPD}	T _J = +25°C	115	144	188	ms
		T _J = -40°C to +85°C	67		208	
Discharge Over-Current Detection Delay ⁽¹⁾	t _{ODD}	T _J = +25°C	57	80	113	ms
		T _J = -40°C to +85°C	33		125	
Discharge Over-Current Retry Time ⁽¹⁾	t _{RETRY}	T _J = +25°C	461	528	609	ms
		T _J = -40°C to +85°C	268		676	
Charge Over-Current Detection Delay ⁽¹⁾	t _{OCD}	T _J = +25°C	57	80	113	ms
		T _J = -40°C to +85°C	33		125	
Discharge Short-Circuit Detection Delay	t _{OCSD}	T _J = +25°C	0.196	0.3	0.5	ms
		T _J = -40°C to +85°C	0.14		0.7	
Discharge Over-Current Retries	N			8		Times
Discharge Short-Circuit Current	I _{SC}	SGM41100-____13		2 × I _{OD}		A
		Other Options		3 × I _{OD}		

NOTE:

1. The TYP value and MAX value are combination of the detection delay time and a possible polling period of about 32ms, while the MIN value represents the minimum detection delay with portion of a polling period added, as the pass path cutting action is synchronized to the internal polling.

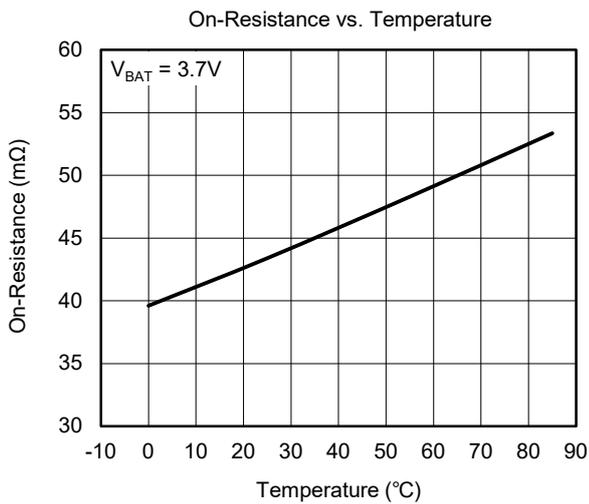
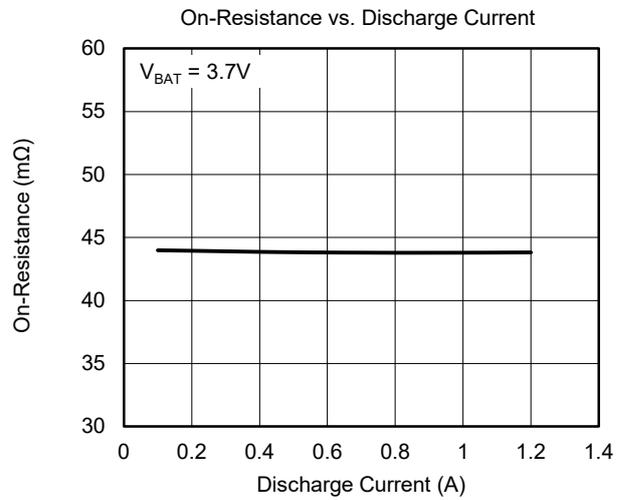
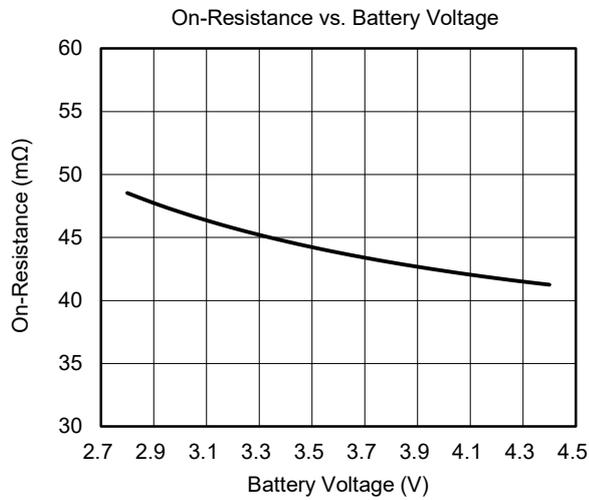
TYPICAL PERFORMANCE CHARACTERISTICS

$T_J = +25^\circ\text{C}$, $I_{\text{CHG}} = I_{\text{DIS}} = 200\text{mA}$, $V_{\text{BAT}} = 3.7\text{V}$, unless otherwise noted.



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

$T_J = +25^\circ\text{C}$, $I_{\text{CHG}} = I_{\text{DIS}} = 200\text{mA}$, $V_{\text{BAT}} = 3.7\text{V}$, unless otherwise noted.



DETAILED DESCRIPTION

The SGM41100 monitors voltage and current applied on battery cell connected between PCKP and BATN, and opens the connection between battery and pack terminal with its internal switches when a fault condition is detected.

Voltage Related Protections

When battery voltage reaches over-voltage threshold (V_{OV}), the charge path is open-circuit. The path closes again when the charger voltage is lower than battery voltage and the battery voltage falls back about V_{OVHYS} below the over-voltage threshold (V_{OV}).

In order to protect the battery from discharge under-voltage status when battery voltage falls below V_{UV} , the discharge path is open-circuit. If the battery voltage falls low further, at about 1.67V, the device enters into shutdown in order to further reduce the current consumption, which helps to keep the battery from harmful exhausted condition as long as possible. The path closes again when a charging supply is applied and the battery voltage rises to about V_{UVHYS} above the V_{UV} threshold.

Charge an exhausted battery: While the battery is over-discharged the battery could be in the following states.

- a) Battery below 0.2V: When the battery voltage (PCKP to BATN) is lower than 0.2V, all charge and discharge paths are disconnected.
- b) Battery voltage between 0.2V to shutdown threshold: In this state, the battery charges through the internal power MOSFET body diode. All internal circuitry is off. Discharge is not allowed.
- c) Battery voltage between shutdown threshold and under-voltage threshold: In this condition, the part allows charging in hiccup mode and charge over-current detection and protection are provided. During the hiccup mode, the power MOSFET is on for 128ms, and off for 2ms. During the 2ms off time of the power MOSFET, the battery is charged through the power MOSFET body diode. Discharge of the battery is not allowed.
- d) Battery voltage above under-voltage threshold: In this condition, the chip enters normal operation and charge and discharge modes are allowed.

Current Related Protections

When discharge over-current condition occurs and keeps for discharge over-current detection delay (t_{ODD}), the discharge path opens. The path closes again after t_{RETRY} for retrying. The SGM41100 keeps retrying for N (8) times. If the over-current condition remains after N retries, the SGM41100 enters a non-conducting locked-off state and stays in this state until being reactivated.

During a charging condition if a charge over-current is identified, the SGM41100 enters the locked-off state. This state can be reset by charger removal (pack removal).

Short-circuit protection: When discharge current exceeds 3 times or 2 times of the over-current threshold (3 times for _04/_06/_09 options, 2 times for _13 option), discharge path disconnects instantly in t_{OCSD} , in order to protect the battery from potential over-current stress. After this disconnection, the SGM41100 stays in the locked-off non-conducting state until being reactivated.

Burst load outrush: In many systems, overload conditions will occur momentarily. The device allows for this short duration discharge condition by allowing the discharge path to remain closed even after a discharge over-current is detected for duration of discharge over-current detection delay.

When a charge over-current condition is identified, and after charge over-current detection deglitch, the charge path is cut off. The device restores to the conducting state when the PCKP to PCKN voltage drops about 30mV lower than the battery voltage.

Parallel battery packs: When paralleling two battery packs utilizing SGM41100s, a momentary current surge may cause charge over-current protection in the pack with the lower voltage. The higher voltage pack can enter a discharge over-current protection. The charge over-current or discharge over-current protection resets only after the higher voltage battery pack discharges to a voltage slightly lower than the lower voltage pack. After this discharge, both packs will conduct.

It is highly recommended that the packs should be placed into a locked-open non-conducting state first (by connecting BYPS to PCKN momentarily) before being paralleled to avoid current overstress. When a charge supply is applied to the paralleled packs, the locked-open state will release.

DETAILED DESCRIPTION (continued)

Battery delivery state: It is recommended to deliver a battery pack in a locked-off non-conducting state to avoid unintentional shorting during production handling or transportation. The circuit of Figure 1 places the SGM41100 into a locked-off state after battery attachment by momentarily shorting BYPS and PCKN.

Connecting a 220nF capacitor clapping between BATN and PCKN may place the device into conducting state, which might couple enough charge for making enough voltage difference between PCKN and PCKP for over about 1.3V. The voltage difference is the dividing result of the clapping capacitance and the load resistance and capacitance. The 220nF capacitance is recommended for no load condition.

Pack activation: In order to release the pack from locked-off state and to place it into a conducting state, apply a charging input, or connect PCKN to BATN momentarily when there is no high load capacitance.

Caution: Charging the load capacitance may induce excessive high current surge when shorting the PCKN and BATN with a bit of low resistance jumping wire or metal tweezers, which may cause damage to the device if contact bouncing occurs during the current surge. Do not short the PCKN and BATN for activation unless it is certain no capacitor is loaded.

Surge, ESD and Reversed Attachment

The SGM41100 absorbs voltage surge applied between PCKP and PCKN, by passing the surge current through its switch and the battery. Surge may occur when attaching the pack or battery cell.

The SGM41100 survives either if a cell is placed in reverse or a charge input is attached in reverse, but not both at the same time. Any of these reverse attachments, short circuits, inrush surges and outrush will cause overstress. Do not test those cases in normal production inspection, as this kind of test itself may cause performance degradation or even damage the device.

Caution about ESD damage to the battery: The battery pack might be the biggest element in equipment and induce much during an ESD event. Careful design of guided discharge path is desired for the equipment

case sealing air-gap discharge over the battery and those connect to the battery closely.

Caution on electrochemical corrosion: As a battery can apply potential over the electrodes continuously and cause electrochemical corrosion, the corrosion product may spread in the hollow beneath a surface mount device and cause leakage. Moisture-proof coating is recommended, especially when using compact devices.

Cautions for Evaluation Test

Some types of electronic load simulators may have excessive inrush current, and some BPM testers may have voltage transition surges, which may trigger the protection of the SGM41100. Careful attention is required for doing such evaluations with these kinds of equipment. External voltage and current limits within the conditions specified in the Absolute Maximum Ratings section of this datasheet are required.

Select Protection Parameters

Battery models from different vendors may be customized for different applications. Consult the battery vendor for protection limits for specific battery model.

Parameters for the protection circuit and of the charger circuit affecting same variables should be set for proper charge or discharge protection sequence. For example, the over-voltage threshold of the battery should be 50mV ~ 100mV higher than constant voltage threshold of the charger.

Cautions on parameter misalignment: If the V_{OV} is lower than the full charge voltage of the battery charger, the protection circuit cuts off the battery charge path before the battery is fully charged, and turns into the non-conductive locked-off state; if the I_{OC} is lower than the charge current, the protection circuit also turns itself into the locked-off state. In either V_{OV} or I_{OC} , the charger input should be removed and then reapplied for activating the protection circuit from the locked-off state to the conducting state. If the charger is not removed after a V_{OV} or I_{OV} event, the battery will not be charged even if the battery voltage is depleted.

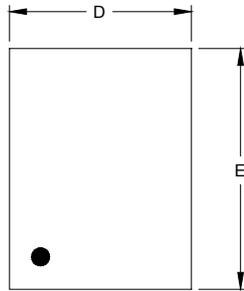
REVISION HISTORY

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

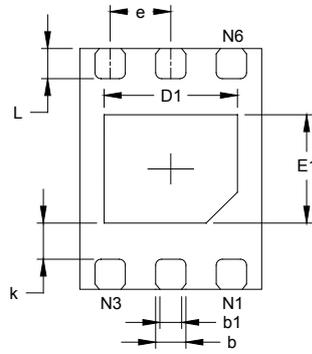
	Page
SEPTEMBER 2021 – REV.A.4 to REV.B	
Updated Electrical Characteristics section	11
SEPTEMBER 2019 – REV.A.3 to REV.A.4	
Updated Function Description section.....	14, 15
APRIL 2019 – REV.A.2 to REV.A.3	
Updated Typical Application section	1
Updated Pin Description section	9
MARCH 2019 – REV.A.1 to REV.A.2	
Updated Electrical Characteristics section	11
SEPTEMBER 2018 – REV.A to REV.A.1	
Changed the Device Description table	7
Changes from Original (AUGUST 2018) to REV.A	
Changed from product preview to production data.....	All

PACKAGE OUTLINE DIMENSIONS

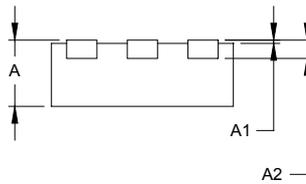
UTDFN-1.5×2-6L



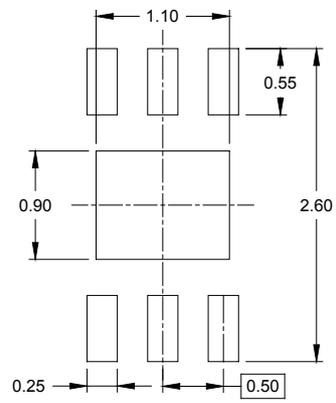
TOP VIEW



BOTTOM VIEW



SIDE VIEW



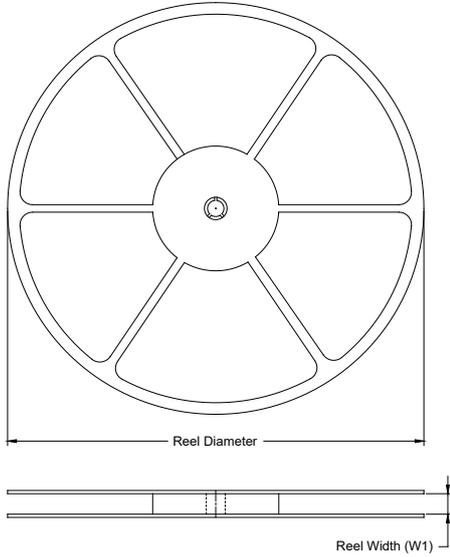
RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.500	0.600	0.020	0.024
A1	0.000	0.050	0.000	0.002
A2	0.152 REF		0.006 REF	
D	1.400	1.600	0.055	0.063
D1	1.000	1.200	0.039	0.047
E	1.900	2.100	0.075	0.083
E1	0.800	1.000	0.031	0.039
k	0.300 REF		0.012 REF	
b	0.200	0.300	0.008	0.012
b1	0.180 REF		0.007 REF	
e	0.500 BSC		0.020 BSC	
L	0.200	0.300	0.008	0.012

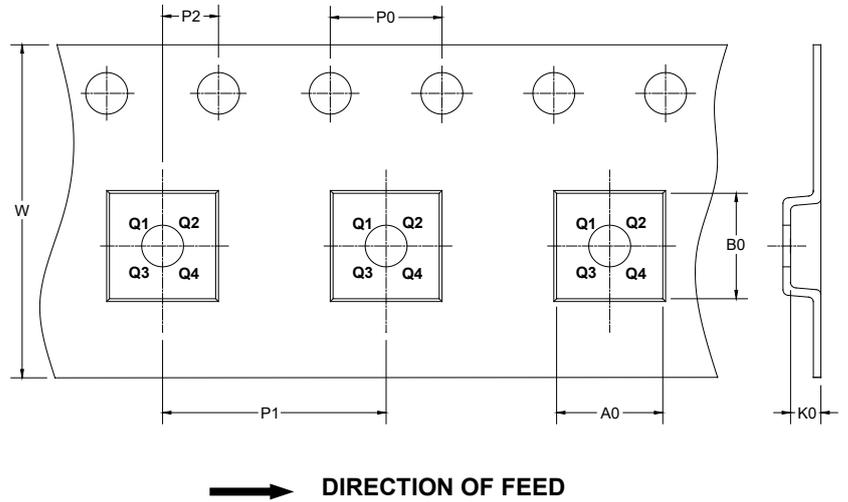
PACKAGE INFORMATION

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

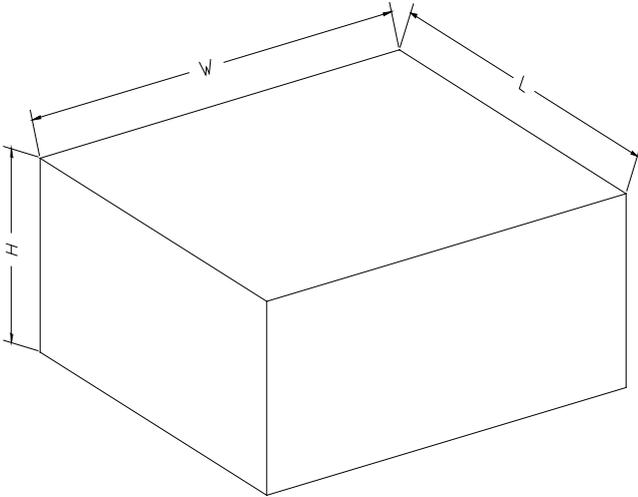
KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
UTDFN-1.5×2-6L	7"	9.5	1.70	2.30	0.75	4.0	4.0	2.0	8.0	Q2

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PACKAGE INFORMATION

CARTON BOX DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
7" (Option)	368	227	224	8
7"	442	410	224	18

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