



SGM2040R

300mA, CMOS LDO Regulator with Ultra-Low Quiescent Current and Fast Load Transient Response

GENERAL DESCRIPTION

The SGM2040R is an ultra-low current consumption, low dropout voltage and high accuracy linear regulator. It is capable of supplying 300mA output current with only 2.2 μ A (TYP) current consumption. The typical dropout voltage is only 110mV at 300mA. The operating input voltage range is from 1.6V to 6.5V and output voltage range is from 1.2V to 5.0V.

Other features include logic-controlled shutdown mode, short-circuit current limit and thermal shutdown protection. The SGM2040R has automatic discharge function to quickly discharge V_{OUT} in the disabled status.

The SGM2040R is available in Green SOT-23-5 and XTDFN-1 $\times$ 1-4L packages. It operates over an operating temperature range of -40 $^{\circ}$ C to +125 $^{\circ}$ C.

FEATURES

- Operating Input Voltage Range: 1.6V to 6.5V
- Enable Pin Accept Voltages Higher than the Supply Voltage and up to 5.5V
- Fixed Output from 1.2V to 5.0V
- 300mA Output Current
- Output Voltage Accuracy: $\pm 1\%$ at +25 $^{\circ}$ C (SOT-23-5)
- Ultra-Low Current Consumption: 2.2 μ A (TYP)
- Low Dropout Voltage: 110mV (TYP) at 300mA, $V_{OUT(NOM)} = 5V$
- Low Reverse Leakage Current: 0.25 μ A (TYP) when $V_{OUT} > V_{IN}$
- High PSRR: 70dB at 1kHz
- Current Limiting and Thermal Protection
- Excellent Load and Line Transient Responses
- With Output Automatic Discharge
- Stable with Small Case Size Ceramic Capacitors
- -40 $^{\circ}$ C to +125 $^{\circ}$ C Operating Temperature Range
- Available in Green SOT-23-5 and XTDFN-1 $\times$ 1-4L Packages

APPLICATIONS

Wearable Device
Smart Phone
Portable Equipment

TYPICAL APPLICATION

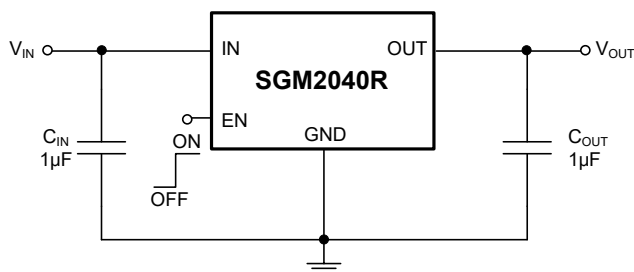


Figure 1. Typical Application Circuit

300mA, CMOS LDO Regulator with Ultra-Low Quiescent Current and Fast Load Transient Response

SGM2040R

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM2040R-1.2	SOT-23-5	-40°C to +125°C	SGM2040R-1.2XN5G/TR	25B XXXXX	Tape and Reel, 3000
SGM2040R-1.5	SOT-23-5	-40°C to +125°C	SGM2040R-1.5XN5G/TR	20I XXXXX	Tape and Reel, 3000
SGM2040R-1.8	SOT-23-5	-40°C to +125°C	SGM2040R-1.8XN5G/TR	2NY XXXXX	Tape and Reel, 3000
SGM2040R-2.5	SOT-23-5	-40°C to +125°C	SGM2040R-2.5XN5G/TR	20J XXXXX	Tape and Reel, 3000
SGM2040R-2.8	SOT-23-5	-40°C to +125°C	SGM2040R-2.8XN5G/TR	20K XXXXX	Tape and Reel, 3000
SGM2040R-3.0	SOT-23-5	-40°C to +125°C	SGM2040R-3.0XN5G/TR	20L XXXXX	Tape and Reel, 3000
SGM2040R-3.3	SOT-23-5	-40°C to +125°C	SGM2040R-3.3XN5G/TR	25C XXXXX	Tape and Reel, 3000
SGM2040R-3.6	SOT-23-5	-40°C to +125°C	SGM2040R-3.6XN5G/TR	20M XXXXX	Tape and Reel, 3000
SGM2040R-4.0	SOT-23-5	-40°C to +125°C	SGM2040R-4.0XN5G/TR	20N XXXXX	Tape and Reel, 3000
SGM2040R-4.2	SOT-23-5	-40°C to +125°C	SGM2040R-4.2XN5G/TR	20O XXXXX	Tape and Reel, 3000
SGM2040R-5.0	SOT-23-5	-40°C to +125°C	SGM2040R-5.0XN5G/TR	25D XXXXX	Tape and Reel, 3000
SGM2040R-1.2	XTDFN-1×1-4L	-40°C to +125°C	SGM2040R-1.2XXDH4G/TR	70	Tape and Reel, 5000
SGM2040R-1.3	XTDFN-1×1-4L	-40°C to +125°C	SGM2040R-1.3XXDH4G/TR	5N	Tape and Reel, 5000
SGM2040R-1.5	XTDFN-1×1-4L	-40°C to +125°C	SGM2040R-1.5XXDH4G/TR	71	Tape and Reel, 5000
SGM2040R-1.8	XTDFN-1×1-4L	-40°C to +125°C	SGM2040R-1.8XXDH4G/TR	5O	Tape and Reel, 5000
SGM2040R-2.5	XTDFN-1×1-4L	-40°C to +125°C	SGM2040R-2.5XXDH4G/TR	72	Tape and Reel, 5000
SGM2040R-2.8	XTDFN-1×1-4L	-40°C to +125°C	SGM2040R-2.8XXDH4G/TR	73	Tape and Reel, 5000
SGM2040R-3.0	XTDFN-1×1-4L	-40°C to +125°C	SGM2040R-3.0XXDH4G/TR	74	Tape and Reel, 5000
SGM2040R-3.3	XTDFN-1×1-4L	-40°C to +125°C	SGM2040R-3.3XXDH4G/TR	5P	Tape and Reel, 5000
SGM2040R-3.6	XTDFN-1×1-4L	-40°C to +125°C	SGM2040R-3.6XXDH4G/TR	75	Tape and Reel, 5000
SGM2040R-4.0	XTDFN-1×1-4L	-40°C to +125°C	SGM2040R-4.0XXDH4G/TR	76	Tape and Reel, 5000
SGM2040R-4.2	XTDFN-1×1-4L	-40°C to +125°C	SGM2040R-4.2XXDH4G/TR	77	Tape and Reel, 5000
SGM2040R-5.0	XTDFN-1×1-4L	-40°C to +125°C	SGM2040R-5.0XXDH4G/TR	78	Tape and Reel, 5000

MARKING INFORMATION

NOTE: XXXXX = Date Code, Trace Code and Vendor Code.

SOT-23-5

XXXXX

Vendor Code
Trace Code
Date Code - Year

XTDFN-1×1-4L

YY

Serial Number

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.

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ABSOLUTE MAXIMUM RATINGS

IN to GND	-0.3V to 8V
OUT to GND	-0.3V to 6V
EN to GND	-0.3V to 6V
Package Thermal Resistance	
SOT-23-5, θ_{JA}	160°C/W
SOT-23-5, θ_{JB}	37.7°C/W
SOT-23-5, θ_{JC}	82.3°C/W
XTDFN-1×1-4L, θ_{JA}	139.1°C/W
XTDFN-1×1-4L, θ_{JB}	75.8°C/W
XTDFN-1×1-4L, $\theta_{JC(TOP)}$	101.9°C/W
XTDFN-1×1-4L, $\theta_{JC(BOT)}$	72.7°C/W
Junction Temperature	+150°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (Soldering, 10s)	+260°C
ESD Susceptibility ^{(1) (2)}	
HBM	±4000V
CDM	±1000V

NOTES:

1. For human body model (HBM), all pins comply with ANSI/ESDA/JEDEC JS-001 specifications.
2. For charged device model (CDM), all pins comply with ANSI/ESDA/JEDEC JS-002 specifications.

RECOMMENDED OPERATING CONDITIONS

Input Voltage Range	1.6V to 6.5V
Enable Input Voltage Range	0V to 5.5V
Input Effective Capacitance, C_{IN}	0.5 μ F (MIN)
Output Effective Capacitance, C_{OUT}	0.5 μ F to 22 μ F
Operating Junction Temperature Range	-40°C to +125°C
Operating Ambient Temperature Range	-40°C to +125°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

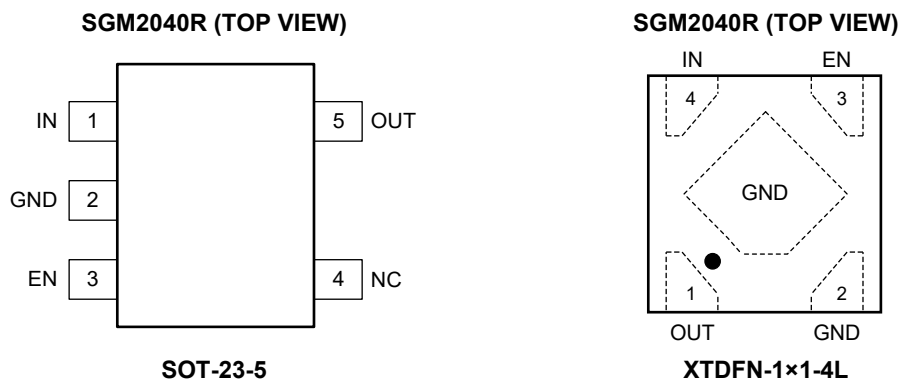
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance 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.

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PIN CONFIGURATIONS



PIN DESCRIPTION

PIN		NAME	FUNCTION
SOT-23-5	XTDFN-1x1-4L		
1	4	IN	Input Supply Voltage Pin. It is recommended to use a 1 μ F or larger ceramic capacitor from IN pin to ground to get good power supply decoupling. This ceramic capacitor should be placed as close as possible to IN pin.
2	2	GND	Ground Pin.
3	3	EN	Enable Pin. Drive EN high to turn on the regulator. Drive EN low to turn off the regulator. The EN pin has an internal pull-down current source.
4	–	NC	Not Connection.
5	1	OUT	Regulator Output Pin. It is recommended to use a ceramic capacitor with effective capacitance in the range of 0.5 μ F to 22 μ F to ensure stability. This ceramic capacitor should be placed as close as possible to OUT pin.
–	Exposed Pad	GND	Exposed Pad. Connect it to a large ground plane to maximize thermal performance. This pad is not an electrical connection point.

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FUNCTIONAL BLOCK DIAGRAM

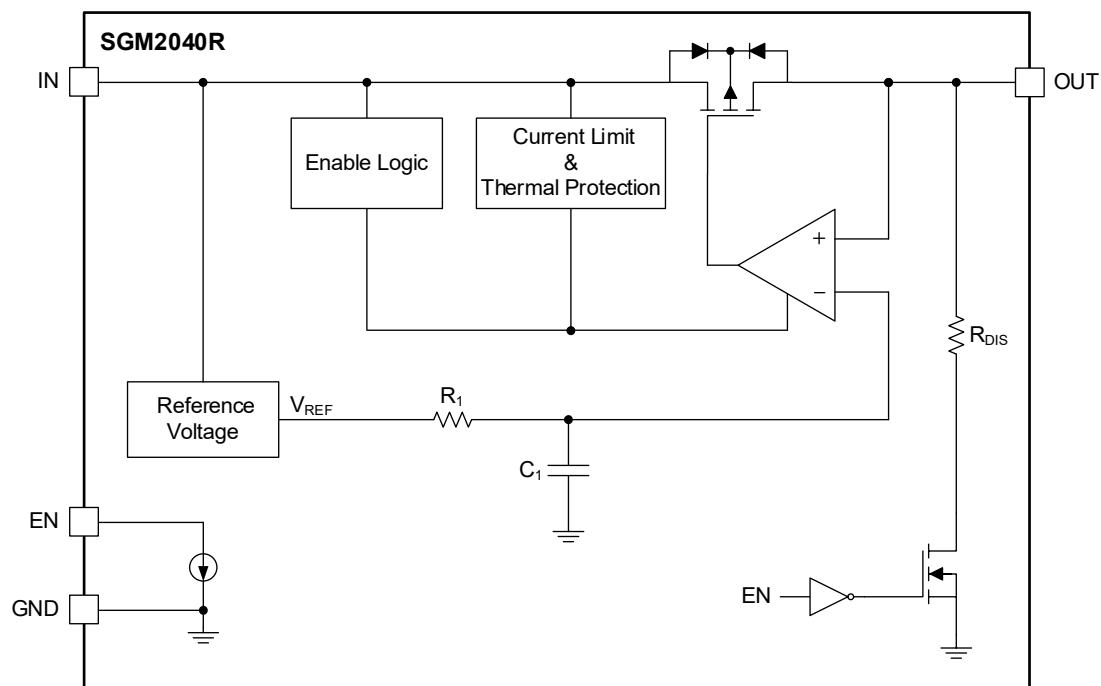
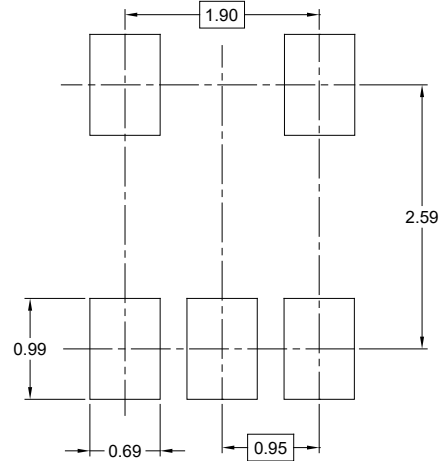
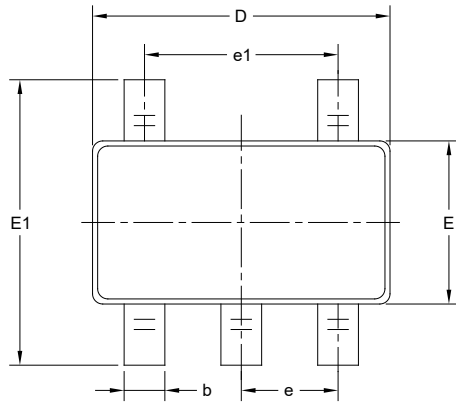


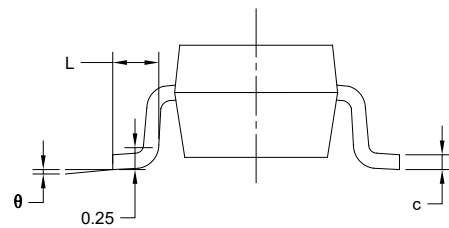
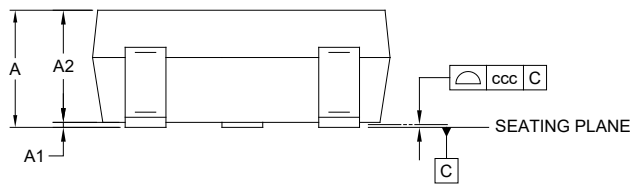
Figure 2. Block Diagram

PACKAGE OUTLINE DIMENSIONS

SOT-23-5



RECOMMENDED LAND PATTERN (Unit: mm)



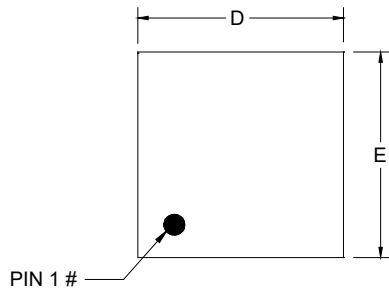
Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	-	-	1.450
A1	0.000	-	0.150
A2	0.900	-	1.300
b	0.300	-	0.500
c	0.080	-	0.220
D	2.750	-	3.050
E	1.450	-	1.750
E1	2.600	-	3.000
e	0.950 BSC		
e1	1.900 BSC		
L	0.300	-	0.600
θ	0°	-	8°
ccc	0.100		

NOTES:

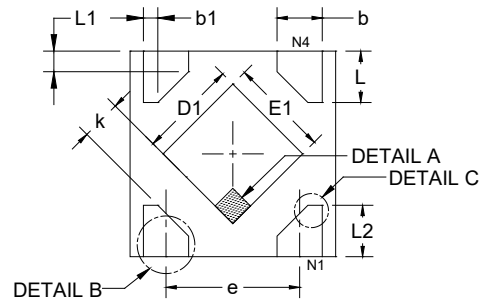
1. This drawing is subject to change without notice.
2. The dimensions do not include mold flashes, protrusions or gate burrs.
3. Reference JEDEC MO-178.

PACKAGE OUTLINE DIMENSIONS

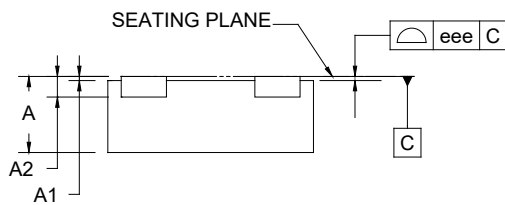
XTDFN-1×1-4L



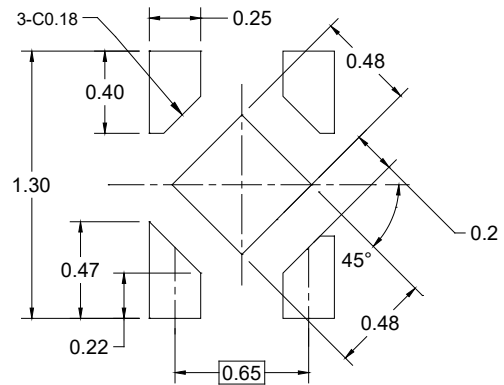
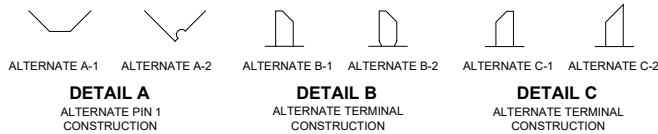
TOP VIEW



BOTTOM VIEW



SIDE VIEW



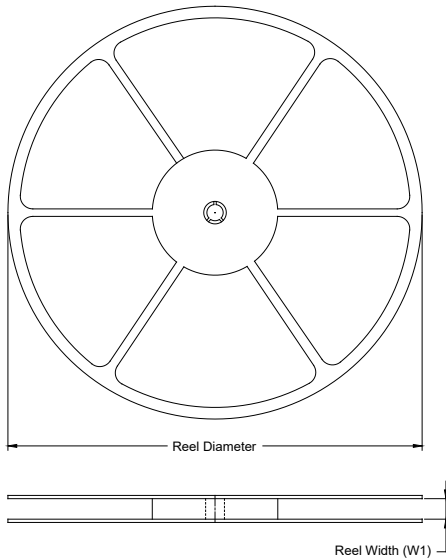
RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	0.340	0.370	0.400
A1	0.000	0.020	0.050
A2	0.100 REF		
b	0.170	-	0.300
b1	0.068 REF		
D	0.950	1.000	1.050
E	0.950	1.000	1.050
D1	0.430	0.480	0.530
E1	0.430	0.480	0.530
L	0.200	0.250	0.300
L1	0.093 REF		
L2	0.200	-	0.370
e	0.650 BSC		
k	0.150	-	-
eee	-	0.050	-

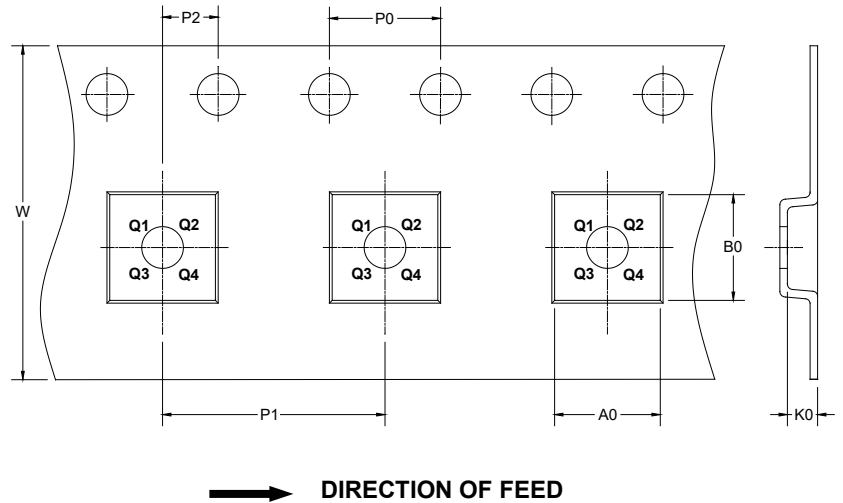
NOTE: This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



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

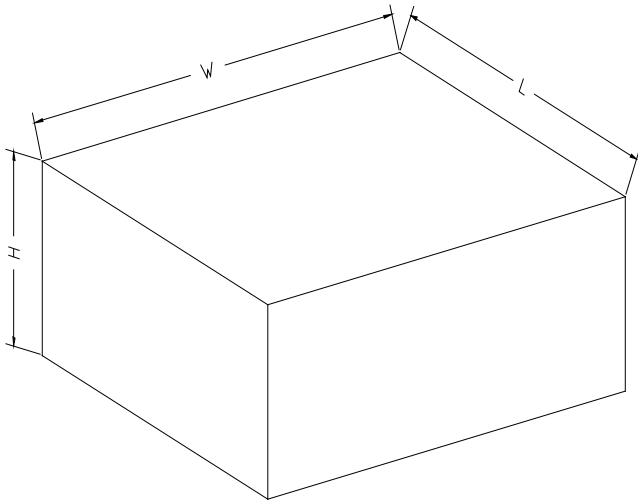
KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SOT-23-5	7"	9.5	3.20	3.20	1.40	4.0	4.0	2.0	8.0	Q3
XTDFN-1×1-4L	7"	9.5	1.14	1.17	0.56	4.0	4.0	2.0	8.0	Q2

DD0001

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

DD0002