



SGM48523/SGM48524A SGM48525/SGM48526

Dual 5A, High-Speed, Low-Side Gate Drivers with Negative Input Voltage Capability

GENERAL DESCRIPTION

The SGM48523/4A/5/6 are dual high-speed low-side gate drivers for MOSFET and IGBT power switches. They have rail-to-rail driving capability and can sink and source up to 5A peak current with capacitive loads. The propagation delays are very short and well matched between the two channels that make the device very fit for applications that need accurate dual gate driving such as synchronous rectifiers. The matched propagation delays also allow for paralleling the two channels when higher driving current is required for example for paralleled switches. The input voltage thresholds are fixed, independent of supply voltage (V_{DD}) and are compatible with low voltage TTL and CMOS logic. Noise immunity is excellent due to the wide hysteresis window between the input low and high thresholds. The devices have internal pull-up/pull-down resistors on the input pins to ensure low state on the driver outputs when the inputs are floating.

The SGM48523/4A/5 offer 3 logic options: dual inverting (SGM48523), dual non-inverting (SGM48524A), and one inverting and one non-inverting (SGM48525). They have independent enable pins (ENA and ENB) for each channel with active-high logic that can be left open for normal operation because of internal pull-up to V_{DD} . The SGM48526 offers a flexible dual input design which can be configured as inverting (-INx) or non-inverting (+INx) for each channel. Both inputs (+INx or -INx) can control the output state. Typically, one input is used for gate pulse and the other one is used for enable/disable function.

The SGM48523/4A/5 are available in SOIC-8, MSOP-8 (Exposed Pad) and TDFN-3×3-8L packages. The SGM48526 is available in a Green TDFN-3×3-8L package. They operate over a temperature range of -40°C to +140°C.

FEATURES

- Two Independent Gate Drive Channels
- 4.5V to 18V Single Supply Range (V_{DD})
- 5A Peak Source/Sink Pulse Current Drive
- Independent Enable Pin for Each Channel
- TTL and CMOS Compatible Logic Threshold
- Logic Levels Independent of Supply Voltage
- Hysteretic Input Logic for High Noise Immunity
- Outputs are Logic Low when Inputs are Floating
- Negative Voltage Handling Capability:
 - ♦ -8V DC at Inputs
 - ♦ -2V, 200ns Pulse for Outputs (OUTx)
- Glitch-Free Operation at Power-Up and Power-Down: Outputs Pulled Low during Supply UVLO
- Fast Propagation Delays: 18ns (TYP)
- Fast Rise Time: 8ns (TYP)
- Fast Fall Time: 8ns (TYP)
- Delay Matching between Two Channels: 1ns (TYP)
- Channels can be Paralleled for Higher Drive Current
- -40°C to +140°C Operating Temperature Range
- Packaging:
 - ♦ SGM48523/4A/5 Available in Green SOIC-8, MSOP-8 (Exposed Pad) and TDFN-3×3-8L Packages
 - ♦ SGM48526 Available in a Green TDFN-3×3-8L Package

APPLICATIONS

Power MOSFETs
IGBT Driving for Power Supplies
DC/DC Converters
Solar Power, Motor Drivers
Gate Drive for Emerging Wide Bandgap Devices

SGM48523/SGM48524A Dual 5A, High-Speed, Low-Side Gate Drivers SGM48525/SGM48526 with Negative Input Voltage Capability

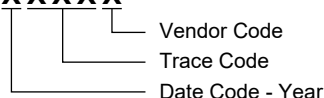
PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM48523	SOIC-8	-40°C to +140°C	SGM48523XS8G/TR	SGM 48523XS8 XXXXX	Tape and Reel, 4000
	MSOP-8 (Exposed Pad)	-40°C to +140°C	SGM48523XPMS8G/TR	SGM48523 XPMS8 XXXXX	Tape and Reel, 4000
	TDFN-3×3-8L	-40°C to +140°C	SGM48523XTDB8G/TR	SGM 48523DB XXXXX	Tape and Reel, 4000
SGM48524A	SOIC-8	-40°C to +140°C	SGM48524AXS8G/TR	SGM CM9XS8 XXXXX	Tape and Reel, 4000
	MSOP-8 (Exposed Pad)	-40°C to +140°C	SGM48524AXPMS8G/TR	SGMR67 XPMS8 XXXXX	Tape and Reel, 4000
	TDFN-3×3-8L	-40°C to +140°C	SGM48524AXTDB8G/TR	SGM R66DB XXXXX	Tape and Reel, 4000
SGM48525	SOIC-8	-40°C to +140°C	SGM48525XS8G/TR	SGM 48525XS8 XXXXX	Tape and Reel, 4000
	MSOP-8 (Exposed Pad)	-40°C to +140°C	SGM48525XPMS8G/TR	SGM48525 XPMS8 XXXXX	Tape and Reel, 4000
	TDFN-3×3-8L	-40°C to +140°C	SGM48525XTDB8G/TR	SGM 48525DB XXXXX	Tape and Reel, 4000
SGM48526	TDFN-3×3-8L	-40°C to +140°C	SGM48526XTDB8G/TR	SGM 48526DB XXXXX	Tape and Reel, 4000

MARKING INFORMATION

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

XXXXX



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.

ABSOLUTE MAXIMUM RATINGS

Supply Voltage, V_{DD}	-0.3V to 20V
INA, INB, ENA, ENB Voltage.....	-8V to 20V
OUTA, OUTB Voltage (DC).....	-0.3V to $V_{DD} + 0.3V$
OUTA, OUTB Voltage (Pulse < 200ns).....	-2V to $V_{DD} + 0.3V$
Package Thermal Resistance	
SOIC-8, θ_{JA}	121°C/W
MSOP-8 (Exposed Pad), θ_{JA}	55°C/W
TDFN-3×3-8L, θ_{JA}	70°C/W
Junction Temperature.....	+150°C
Storage Temperature Range.....	-65°C to +150°C
Lead Temperature (Soldering, 10s).....	+260°C
ESD Susceptibility	
HBM.....	4000V
CDM.....	1000V

RECOMMENDED OPERATING CONDITIONS

Supply Voltage Range.....	4.5V to 18V
Input Voltage, INA, INB.....	-2V to 18V
Enable Voltage, ENA and ENB.....	-2V to 18V
Operating Junction Temperature Range.....	-40°C to +140°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.

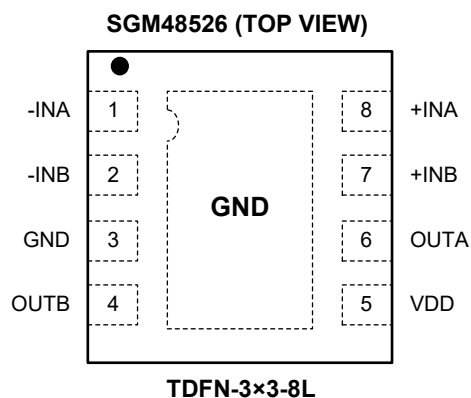
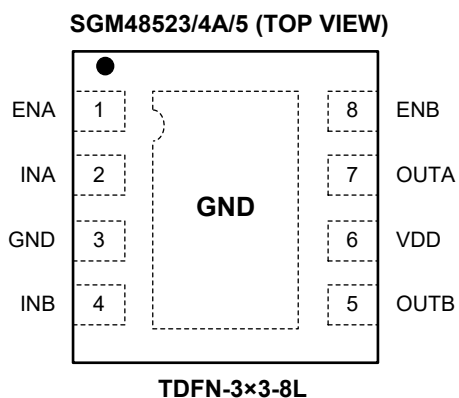
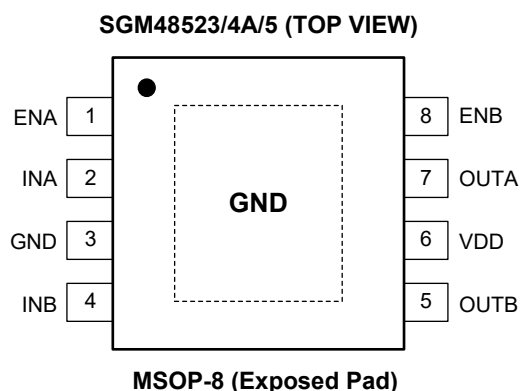
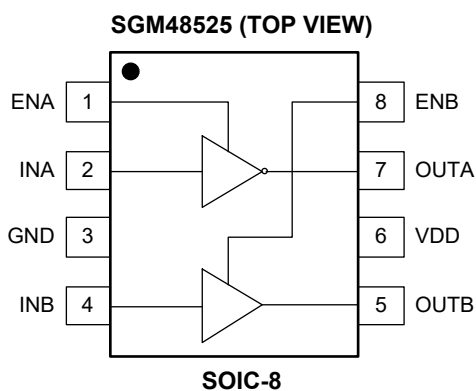
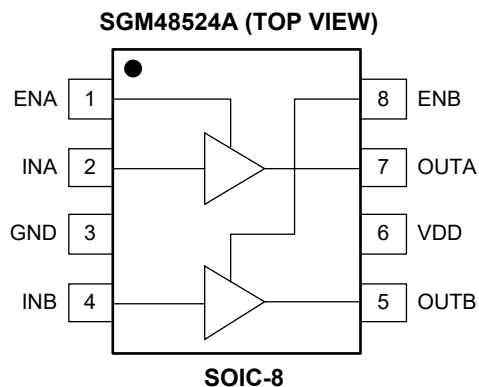
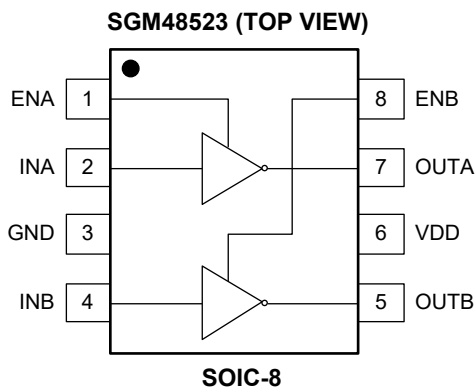
ESD SENSITIVITY CAUTION

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.

PIN CONFIGURATIONS



PIN DESCRIPTIONS

Table 1. Pin Functions of SGM48523, SGM48524A and SGM48525

PIN	NAME	I/O	FUNCTION
1	ENA	I	Channel A Enable Input. Pull ENA high or leave it floating to enable OUTA output. Pull ENA low to disable OUTA output, ignoring INA state.
2	INA	I	Channel A Input. Inverting configuration in SGM48523/5 and non-inverting configuration in SGM48524A. OUTA is logic low if INA is unbiased or left floating.
3	GND	—	Ground. Reference pin for all signals.
4	INB	I	Channel B Input. Inverting configuration in SGM48523 and non-inverting configuration in SGM48524A/5. OUTB is logic low if INB is unbiased or left floating.
5	OUTB	O	Channel B Output.
6	VDD	I	Power Supply Input.
7	OUTA	O	Channel A Output.
8	ENB	I	Channel B Enable Input. Pull ENB high or leave it floating to enable OUTB output. Pull ENB low to disable OUTB output, ignoring INB state.
Exposed Pad	GND	—	Exposed Pad. It should be soldered to PCB board and connected to GND.

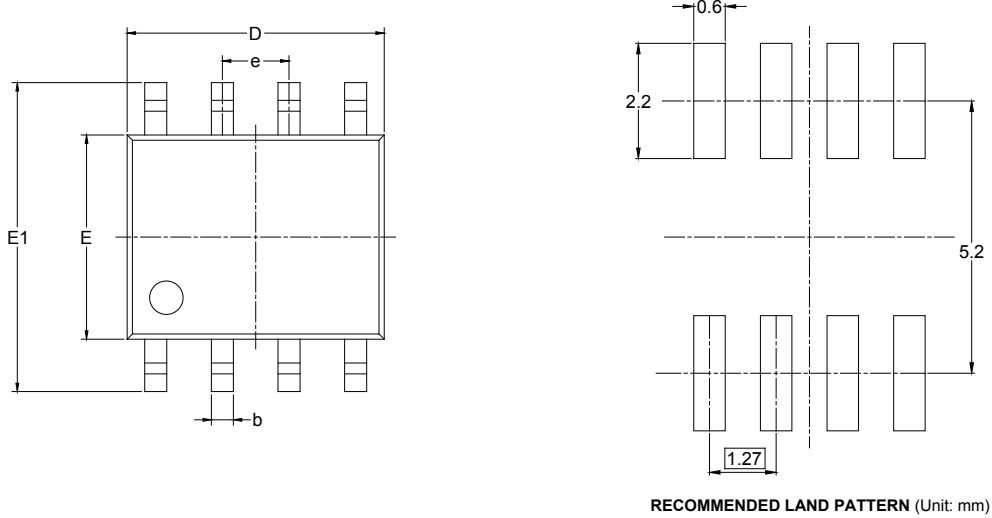
Table 2. Pin Function of SGM48526

PIN	NAME	I/O	FUNCTION
1	-INA	I	Channel A Inverting Input. When +INA is used as a non-inverting input, pull -INA down to GND to enable OUTA output. OUTA is logic low if -INA is unbiased or left floating.
2	-INB	I	Channel B Inverting Input. When +INB is used as a non-inverting input, pull -INB down to GND to enable OUTB output. OUTB is logic low if -INB is unbiased or left floating.
3	GND	—	Ground. Reference pin for all signals.
4	OUTB	O	Channel B Output.
5	VDD	I	Power Supply Input.
6	OUTA	O	Channel A Output.
7	+INB	I	Channel B Non-Inverting Input. When -INB is used as an inverting input, pull +INB up to VDD to enable OUTB output. OUTB is logic low if +INB is unbiased or left floating.
8	+INA	I	Channel A Non-Inverting Input. When -INA is used as an inverting input, pull +INA up to VDD to enable OUTA output. OUTA is logic low if +INA is unbiased or left floating.
Exposed Pad	GND	—	Exposed Pad. It should be soldered to PCB board and connected to GND.

NOTE: I: input, O: output.

PACKAGE OUTLINE DIMENSIONS

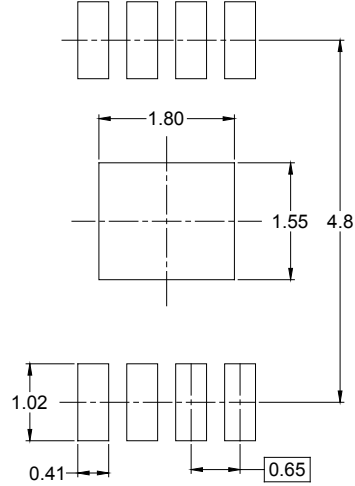
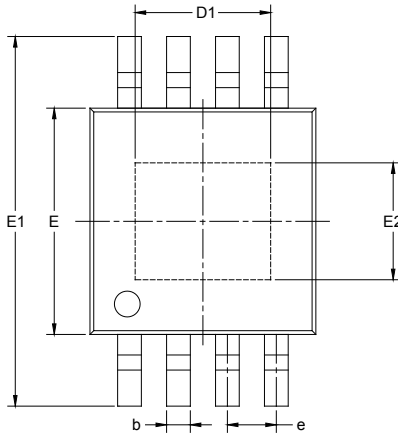
SOIC-8



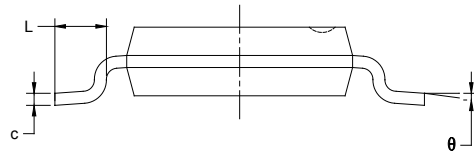
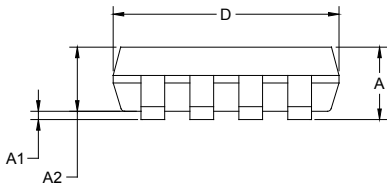
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.27 BSC		0.050 BSC	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

PACKAGE OUTLINE DIMENSIONS

MSOP-8 (Exposed Pad)



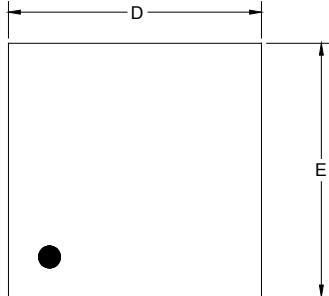
RECOMMENDED LAND PATTERN (Unit: mm)



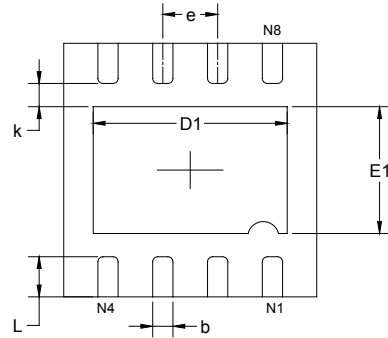
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.250	0.380	0.010	0.015
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
D1	1.700	1.900	0.067	0.075
e	0.65 BSC		0.026 BSC	
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
E2	1.450	1.650	0.057	0.065
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°

PACKAGE OUTLINE DIMENSIONS

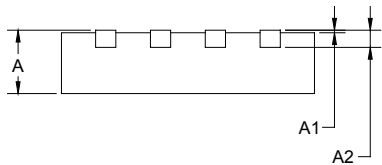
TDFN-3x3-8L



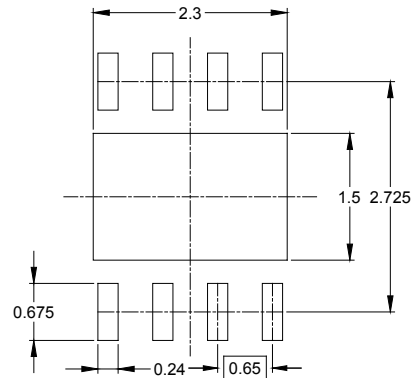
TOP VIEW



BOTTOM VIEW



SIDE VIEW



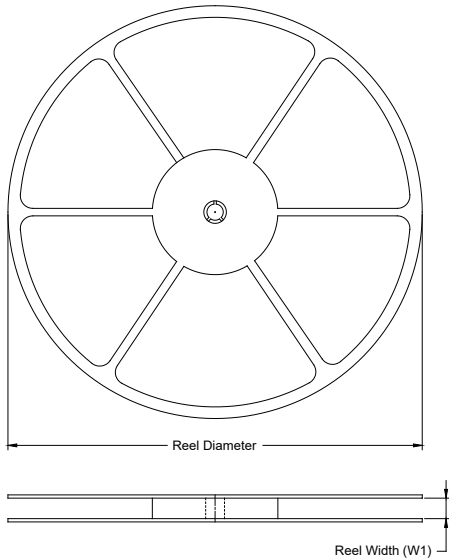
RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.203 REF		0.008 REF	
D	2.900	3.100	0.114	0.122
D1	2.200	2.400	0.087	0.094
E	2.900	3.100	0.114	0.122
E1	1.400	1.600	0.055	0.063
k	0.200 MIN		0.008 MIN	
b	0.180	0.300	0.007	0.012
e	0.650 TYP		0.026 TYP	
L	0.375	0.575	0.015	0.023

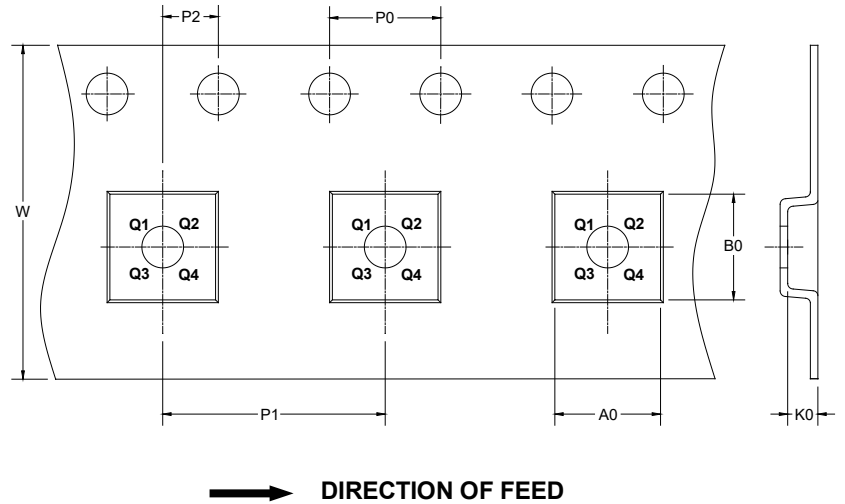
PACKAGE INFORMATION

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



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

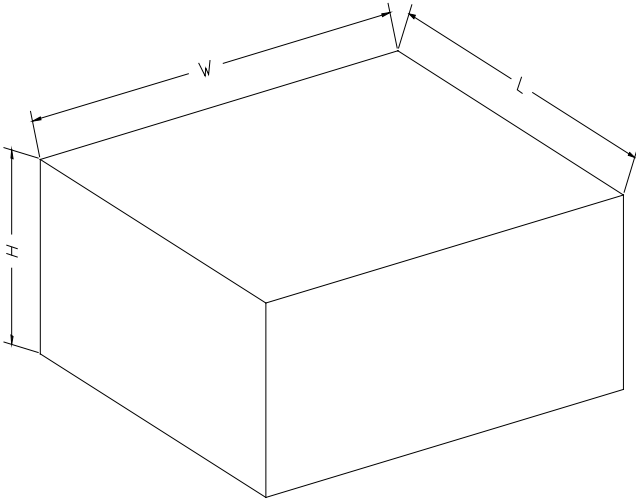
KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SOIC-8	13"	12.4	6.40	5.40	2.10	4.0	8.0	2.0	12.0	Q1
MSOP-8 (Exposed Pad)	13"	12.4	5.20	3.30	1.50	4.0	8.0	2.0	12.0	Q1
TDFN-3×3-8L	13"	12.4	3.35	3.35	1.13	4.0	8.0	2.0	12.0	Q1

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
13"	386	280	370	5

DD0002