BAS19L, BAS20L, BAS21L, BAS21DW5

High Voltage Switching Diode

Features

- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant
- S and NSV Prefixes for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Continuous Reverse Voltage BAS19 BAS20 BAS21	V_R	 120 200 250	Vdc
Repetitive Peak Reverse Voltage BAS19 BAS20 BAS21	V_{RRM}	 120 200 250	Vdc
Continuous Forward Current	I_F	200	mAdc
Peak Forward Surge Current (1/2 Cycle, Sine Wave, 60 Hz)	I_{FSM}	2	A
Repetitive Peak Forward Current (Pulse Train: T_{ON} = 1 s, T_{OFF} = 0.5 s)	I_{FRM}	0.6	A
Junction and Storage Temperature Range	T_J, T_{stg}	−55 to +150	°C
Power Dissipation (Note 1)	P_D	385	mW
Electrostatic Discharge	ESD	HM < 500 MM < 400	V V

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Mounted on FR−5 Board = 1.0 x 0.75 x 0.062 in.

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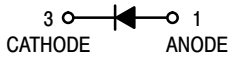
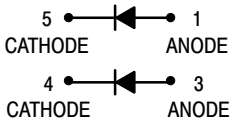
HIGH VOLTAGE SWITCHING DIODE

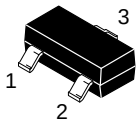
SOT−23



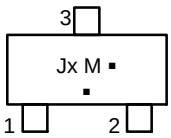
SC−88A



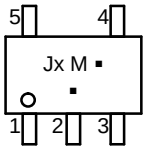
MARKING DIAGRAMS



SOT−23 (TO−236)
CASE 318
STYLE 8



SC−88A (SOT−353)
CASE 419A



x = P, R, or S
P = BAS19L
R = BAS20L
S = BAS21L or BAS21DW5
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*Date Code orientation and/or overbar may vary depending upon the manufacturing location.

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

THERMAL CHARACTERISTICS (SOT−23)

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR−5 Board (Note 2) T_A = 25°C Derate above 25°C	P_D	225 1.8	mW mW/°C
Thermal Resistance Junction−to−Ambient (SOT−23)	$R_{\theta JA}$	556	°C/W
Total Device Dissipation Alumina Substrate (Note 3) T_A = 25°C Derate above 25°C	P_D	300 2.4	mW mW/°C
Thermal Resistance Junction−to−Ambient	$R_{\theta JA}$	417	°C/W
Junction and Storage Temperature Range	T_J, T_{stg}	−55 to +150	°C

THERMAL CHARACTERISTICS (SC−88A)

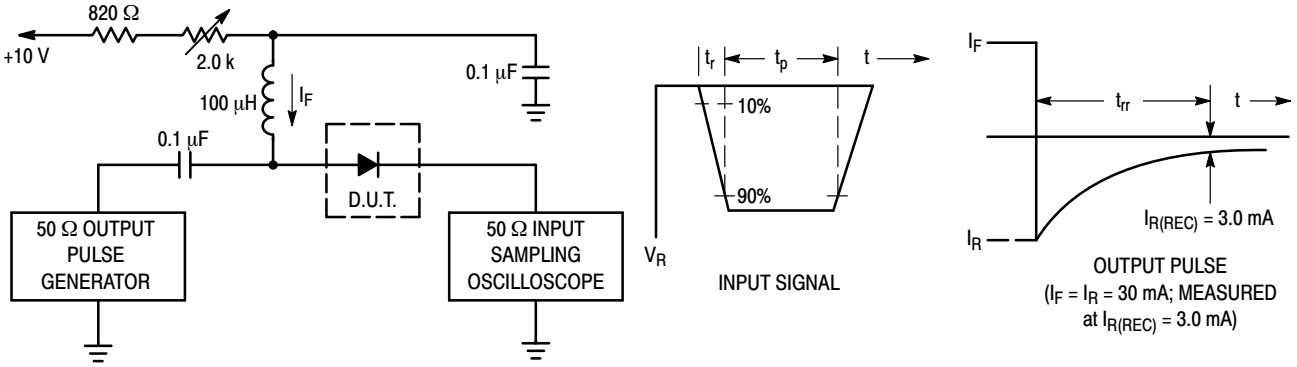
Characteristic	Symbol	Max	Unit
Power Dissipation (Note 4)	P_D	385	mW
Thermal Resistance − Junction−to−Ambient Derate Above 25°C	$R_{\theta JA}$	328 3.0	°C/W mW/°C
Maximum Junction Temperature	T_{Jmax}	150	°C
Operating Junction and Storage Temperature Range	T_J, T_{stg}	−55 to +150	°C

2. FR−5 = 1.0 × 0.75 × 0.062 in.
3. Alumina = 0.4 × 0.3 × 0.024 in. 99.5% alumina.
4. Mounted on FR−5 Board = 1.0 x 0.75 x 0.062 in.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
Reverse Voltage Leakage Current		I_R			μAdc
(V_R = 100 Vdc)	BAS19		−	0.1	
(V_R = 150 Vdc)	BAS20		−	0.1	
(V_R = 200 Vdc)	BAS21		−	0.1	
(V_R = 100 Vdc, T_J = 150°C)	BAS19		−	100	
(V_R = 150 Vdc, T_J = 150°C)	BAS20		−	100	
(V_R = 200 Vdc, T_J = 150°C)	BAS21		−	100	
Reverse Breakdown Voltage		$V_{(BR)}$			Vdc
(I_{BR} = 100 μAdc)	BAS19		120	−	
(I_{BR} = 100 μAdc)	BAS20		200	−	
(I_{BR} = 100 μAdc)	BAS21		250	−	
Forward Voltage		V_F			Vdc
(I_F = 100 mAdc)			−	1.0	
(I_F = 200 mAdc)			−	1.25	
Diode Capacitance (V_R = 0, f = 1.0 MHz)		C_D	−	5.0	pF
Reverse Recovery Time (I_F = I_R = 30 mAdc, $I_{R(REC)}$ = 3.0 mAdc, R_L = 100)		t_{rr}	−	50	ns

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.



Notes: 1. A 2.0 kΩ variable resistor adjusted for a Forward Current (I_F) of 30 mA.
2. Input pulse is adjusted so $I_{R(peak)}$ is equal to 30 mA.
3. $t_p \gg t_{rr}$

Figure 1. Recovery Time Equivalent Test Circuit

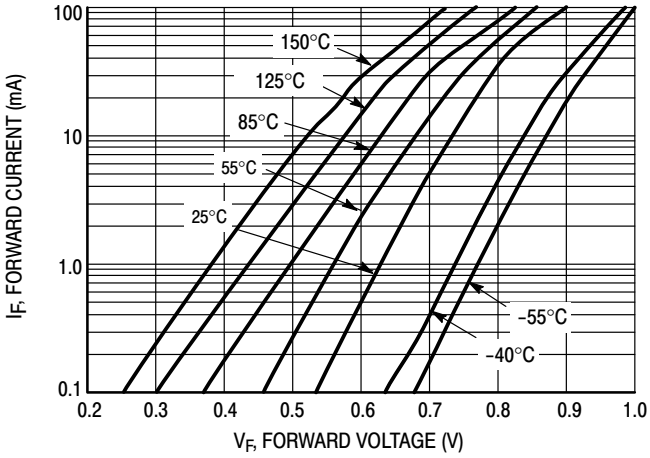


Figure 2. V_F vs. I_F

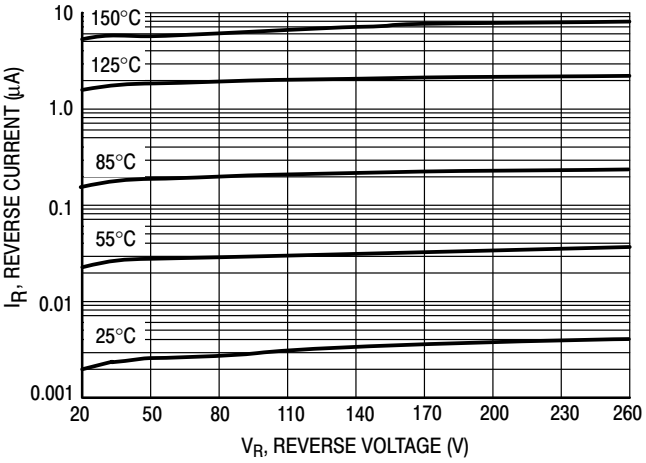


Figure 3. I_R vs. V_R

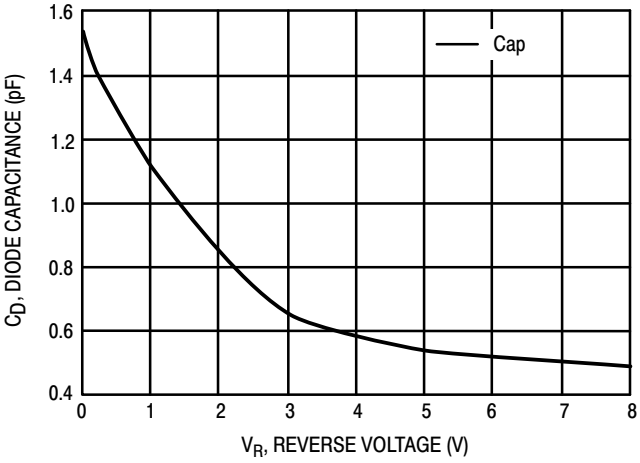


Figure 4. Capacitance

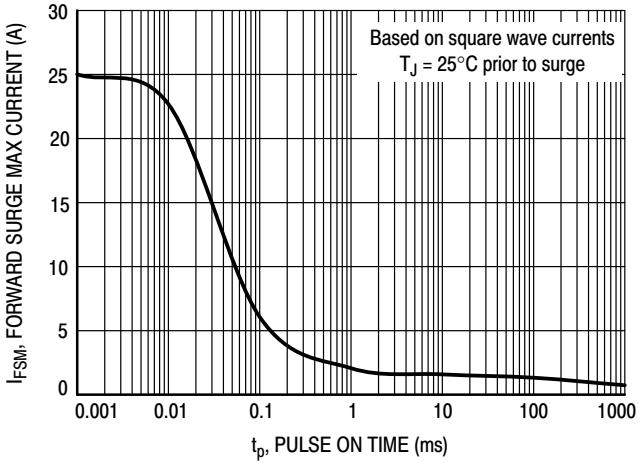


Figure 5. Forward Surge Current

ORDERING INFORMATION

Device	Package	Shipping†
BAS19LT1G	SOT−23 (Pb−Free)	3000 / Tape & Reel
BAS19LT3G	SOT−23 (Pb−Free)	10000 / Tape & Reel
NSVBAS19LT1G*	SOT−23 (Pb−Free)	3000 / Tape & Reel
BAS20LT1G	SOT−23 (Pb−Free)	3000 / Tape & Reel
BAS20LT3G	SOT−23 (Pb−Free)	10000 / Tape & Reel
NSVBAS20LT3G*	SOT−23 (Pb−Free)	10000 / Tape & Reel
SBAS20LT1G*	SOT−23 (Pb−Free)	3000 / Tape & Reel
BAS21LT1G	SOT−23 (Pb−Free)	3000 / Tape & Reel
SBAS21LT1G*	SOT−23 (Pb−Free)	3000 / Tape & Reel
BAS21LT3G	SOT−23 (Pb−Free)	10000 / Tape & Reel
SBAS21LT3G*	SOT−23 (Pb−Free)	10000 / Tape & Reel
BAS21DW5T1G	SC−88A (Pb−Free)	3000 / Tape & Reel
SBAS21DW5T1G*	SC−88A (Pb−Free)	3000 / Tape & Reel
SBAS21DW5T3G*	SC−88A (Pb−Free)	10000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*S and NSV Prefixes for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable.

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

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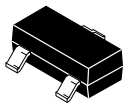
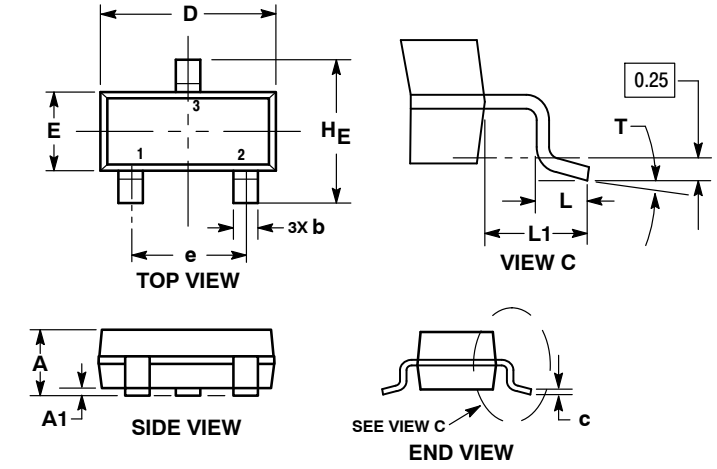


SOT−23 (TO−236)
CASE 318−08
ISSUE AS

DATE 30 JAN 2018

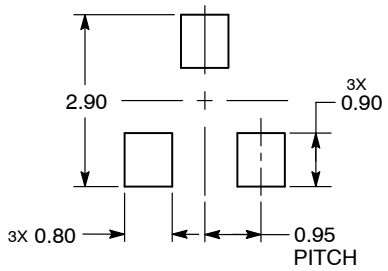
SCALE 4:1



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

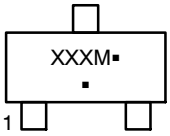
	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.035	0.039	0.044
A1	0.01	0.06	0.10	0.000	0.002	0.004
b	0.37	0.44	0.50	0.015	0.017	0.020
c	0.08	0.14	0.20	0.003	0.006	0.008
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.080
L	0.30	0.43	0.55	0.012	0.017	0.022
L1	0.35	0.54	0.69	0.014	0.021	0.027
H_E	2.10	2.40	2.64	0.083	0.094	0.104
T	0°	−−−	10°	0°	−−−	10°

RECOMMENDED SOLDERING FOOTPRINT



DIMENSIONS: MILLIMETERS

GENERIC MARKING DIAGRAM*



XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “ ▪”, may or may not be present.

STYLE 1 THRU 5:
CANCELLED

STYLE 6:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

STYLE 7:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

STYLE 8:
PIN 1. ANODE
2. NO CONNECTION
3. CATHODE

STYLE 9:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 10:
PIN 1. DRAIN
2. SOURCE
3. GATE

STYLE 11:
PIN 1. ANODE
2. CATHODE
3. CATHODE−ANODE

STYLE 12:
PIN 1. CATHODE
2. CATHODE
3. ANODE

STYLE 13:
PIN 1. SOURCE
2. DRAIN
3. GATE

STYLE 14:
PIN 1. CATHODE
2. GATE
3. ANODE

STYLE 15:
PIN 1. GATE
2. CATHODE
3. ANODE

STYLE 16:
PIN 1. ANODE
2. CATHODE
3. CATHODE

STYLE 17:
PIN 1. NO CONNECTION
2. ANODE
3. CATHODE

STYLE 18:
PIN 1. NO CONNECTION
2. CATHODE
3. ANODE

STYLE 19:
PIN 1. CATHODE
2. ANODE
3. CATHODE−ANODE

STYLE 20:
PIN 1. CATHODE
2. ANODE
3. GATE

STYLE 21:
PIN 1. GATE
2. SOURCE
3. DRAIN

STYLE 22:
PIN 1. RETURN
2. OUTPUT
3. INPUT

STYLE 23:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 24:
PIN 1. GATE
2. DRAIN
3. SOURCE

STYLE 25:
PIN 1. ANODE
2. CATHODE
3. GATE

STYLE 26:
PIN 1. CATHODE
2. ANODE
3. NO CONNECTION

STYLE 27:
PIN 1. CATHODE
2. CATHODE
3. CATHODE

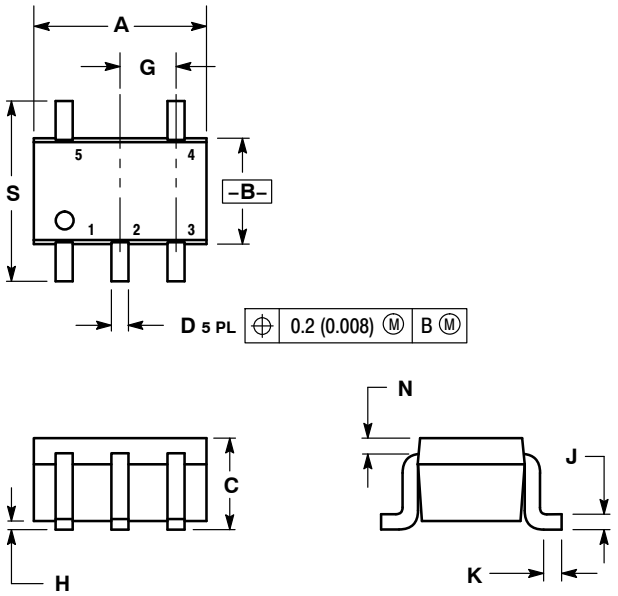
STYLE 28:
PIN 1. ANODE
2. ANODE
3. ANODE

DOCUMENT NUMBER:	98ASB42226B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red.
DESCRIPTION:	SOT−23 (TO−236)	PAGE 1 OF 1

SC−88A (SC−70−5/SOT−353)
CASE 419A−02
ISSUE L

SCALE 2:1

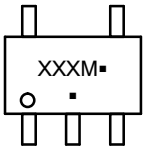
DATE 17 JAN 2013



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419A−01 OBSOLETE. NEW STANDARD 419A−02.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
H	---	0.004	---	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20

GENERIC MARKING DIAGRAM*

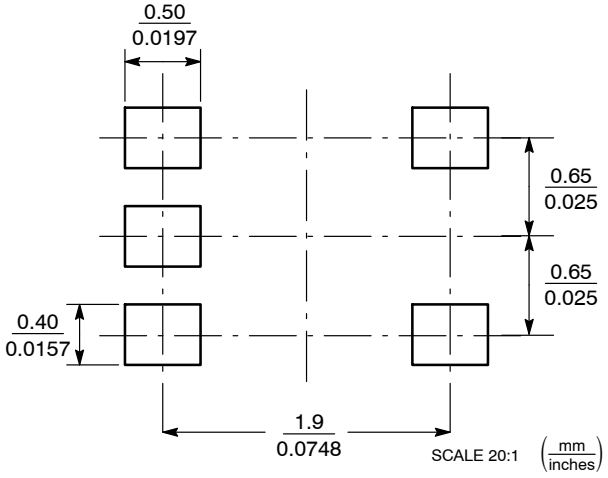


XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*This infomration is generic. Please refer to device data sheet for actual part marking.

SOLDER FOOTPRINT



STYLE 1:
PIN 1. BASE
2. EMITTER
3. BASE
4. COLLECTOR
5. COLLECTOR

STYLE 2:
PIN 1. ANODE
2. EMITTER
3. BASE
4. COLLECTOR
5. CATHODE

STYLE 3:
PIN 1. ANODE 1
2. N/C
3. ANODE 2
4. CATHODE 2
5. CATHODE 1

STYLE 4:
PIN 1. SOURCE 1
2. DRAIN 1/2
3. SOURCE 1
4. GATE 1
5. GATE 2

STYLE 5:
PIN 1. CATHODE
2. COMMON ANODE
3. CATHODE 2
4. CATHODE 3
5. CATHODE 4

STYLE 6:
PIN 1. EMITTER 2
2. BASE 2
3. EMITTER 1
4. COLLECTOR
5. COLLECTOR 2/BASE 1

STYLE 7:
PIN 1. BASE
2. EMITTER
3. BASE
4. COLLECTOR
5. COLLECTOR

STYLE 8:
PIN 1. CATHODE
2. COLLECTOR
3. N/C
4. BASE
5. EMITTER

STYLE 9:
PIN 1. ANODE
2. CATHODE
3. ANODE
4. ANODE
5. ANODE

ISSUE	REVISION	DATE
C	CONVERTED FROM PAPER DOCUMENT TO ELECTRONIC. REQ. BY N LAFEBRE.	20 JUN 1998
D	CONVERTED FROM MOTOROLA TO ON SEMICONDUCTOR. ADDED STYLE 5. REQ. BY E. KIM.	24 JUL 2000
E	ADDED STYLES 6 & 7. REQ. BY S. BACHMAN.	03 AUG 2000
F	DELETED DIMENSION V, WAS 0.3−0.44MM/0.012−0.016IN. REQ. BY G. KWONG.	14 JUN 2001
G	ADDED STYLE 8, REQ. BY S. CHANG; ADDED STYLE 9, REQ. BY S. BACHMAN; ADDED NOTE 4, REQ. BY S. RIGGS	25 JUN 2003
H	CHANGED STYLE 6. REQ. BY C. LIM	28 APR 2005
J	CHANGED TITLE DESCRIPTION. REQ. BY B. LOFTS.	31 AUG 2005
K	CORRECTED TITLE AND DESCRIPTION TO SC−88A (SC−70−5/SOT−353). CORRECTED MARKING DIAGRAM. REQ. BY D. TRUHITTE.	13 JUL 2010
L	ADDED SOLDER FOOTPRINT. REQ. BY I. MARIANO.	17 JAN 2013

PUBLICATION ORDERING INFORMATION

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