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N-CHANNEL ENHANCEMENT MODE MOSFET PLUS NPN TRANSISTOR

Features

- N-Channel MOSFET and NPN Transistor in One Package
- Low On-Resistance
- Very Low Gate Threshold Voltage, 1.0V max
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Ultra-Small Surface Mount Package
- **ESD Protected MOSFET Gate up to 2kV**
- **Lead, Halogen and Antimony Free, RoHS Compliant (Note 1)**
- **"Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

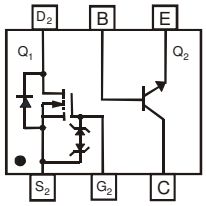
- Case: SOT563
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202, Method 208
- Weight: 0.006 grams (approximate)

ESD PROTECTED TO 2kV

SOT563

Top View

Bottom View



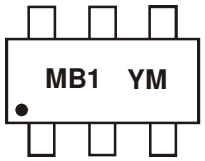
Top View
Internal Schematic

Ordering Information (Note 3)

Part Number	Case	Packaging
DMB53D0UV-7	SOT563	3000/Tape & Reel
DMB53D0UV-13	SOT563	10000/Tape & Reel

Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. No purposely added lead. Halogen and Antimony free
2. Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com.
3. For packaging details, go to our website at http://www.diodes.com.

Marking Information



MB1 = Marking Code
YM = Date Code Marking
Y = Year (ex: V = 2008)
M = Month (ex: 9 = September)

Date Code Key

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Code	V	W	X	Y	Z	A	B	C	D	E

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

Maximum Ratings – MOSFET, Q1 @T_A = 25°C unless otherwise specified

Characteristic		Symbol	Value	Units
Drain-Source Voltage		V_{DSS}	50	V
Gate-Source Voltage		V_{GSS}	±12	V
Drain Current (Note 4)	Continuous	I_D	160	mA
Pulsed Drain Current (Note 4)		I_{DM}	560	mA

Maximum Ratings - NPN Transistor, Q2 @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	50	V
Collector-Emitter Voltage	V_{CEO}	45	V
Emitter-Base Voltage	V_{EBO}	6.0	V
Collector Current	I_C	100	mA

Thermal Characteristics, Total Device @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 1)	P_D	250	mW
Thermal Resistance, Junction to Ambient (Note 1)	$R_{\theta JA}$	500	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Electrical Characteristics - MOSFET @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 5)						
Drain-Source Breakdown Voltage	BV_{DSS}	50	—	—	V	V_{GS} = 0V, I_D = 250μA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	10	μA	V_{DS} = 50V, V_{GS} = 0V
Gate-Body Leakage	I_{GSS}	—	—	1.0 5.0	μA	V_{GS} = ±8V, V_{DS} = 0V V_{GS} = ±12V, V_{DS} = 0V
ON CHARACTERISTICS (Note 5)						
Gate Threshold Voltage	$V_{GS(th)}$	0.7	0.8	1.0	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	—	3.1	4	Ω	V_{GS} = 4V, I_D = 100mA
		—	4	5		V_{GS} = 2.5V, I_D = 80mA
Forward Transconductance	g_{FS}	180	—	—	mS	V_{DS} = 10V, I_D = 100mA, f = 1.0KHz
DYNAMIC CHARACTERISTICS (Note 6)						
Input Capacitance	C_{iss}	—	25	—	pF	V_{DS} = 10V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	5	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	2.1	—	pF	

Notes: 4. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
5. Short duration pulse test used to minimize self-heating effect.
6. Guaranteed by design. Not subject to product testing.

Electrical Characteristics - NPN Transistor @T_A = 25°C unless otherwise specified

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	(Note 5)	$V_{(BR)CBO}$	50	—	—	V	I_C = 10μA, I_B = 0
Collector-Emitter Breakdown Voltage	(Note 5)	$V_{(BR)CEO}$	45	—	—	V	I_C = 10mA, I_B = 0
Emitter-Base Breakdown Voltage	(Note 5)	$V_{(BR)EBO}$	6	—	—	V	I_E = 1μA, I_C = 0
DC Current Gain	(Note 5)	h_{FE}	200	290	450	—	V_{CE} = 5.0V, I_C = 2.0mA
Collector-Emitter Saturation Voltage	(Note 5)	$V_{CE(SAT)}$	—	—	100 300	mV	I_C = 10mA, I_B = 0.5mA I_C = 100mA, I_B = 5.0mA
Base-Emitter Saturation Voltage	(Note 5)	$V_{BE(SAT)}$	—	700 900	—	mV	I_C = 10mA, I_B = 0.5mA I_C = 100mA, I_B = 5.0mA
Base-Emitter Voltage	(Note 5)	V_{BE}	580 —	660 —	700 770	mV	V_{CE} = 5.0V, I_C = 2.0mA V_{CE} = 5.0V, I_C = 10mA
Collector-Cutoff Current	(Note 5)	I_{CBO} I_{CBO}	—	—	15 5.0	nA μA	V_{CB} = 30V V_{CB} = 30V, T_A = 150°C
Collector-Emitter Cut-Off Current	(Note 5)	I_{CES}	—	—	100	nA	V_{CE} = 45V
Gain Bandwidth Product		f_T	100	—	—	MHz	V_{CE} = 5.0V, I_C = 10mA, f = 100MHz
Output Capacitance		C_{OBO}	—	—	4.5	pF	V_{CB} = 10V, f = 1.0MHz
Noise Figure		NF	—	—	10	dB	V_{CE} = 5V, R_S = 2.0kΩ, f = 1.0kHz, BW = 200Hz

MOSFET

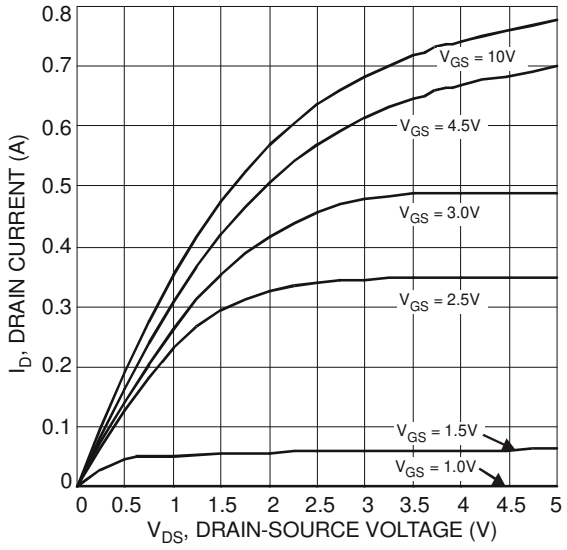


Fig. 1 Typical Output Characteristics

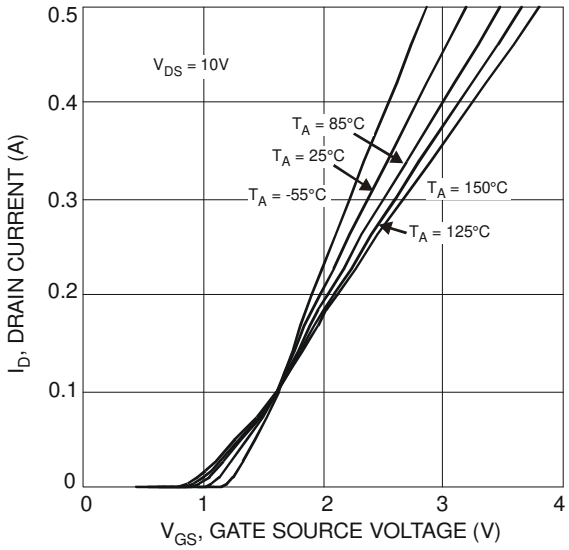


Fig. 2 Typical Transfer Characteristics

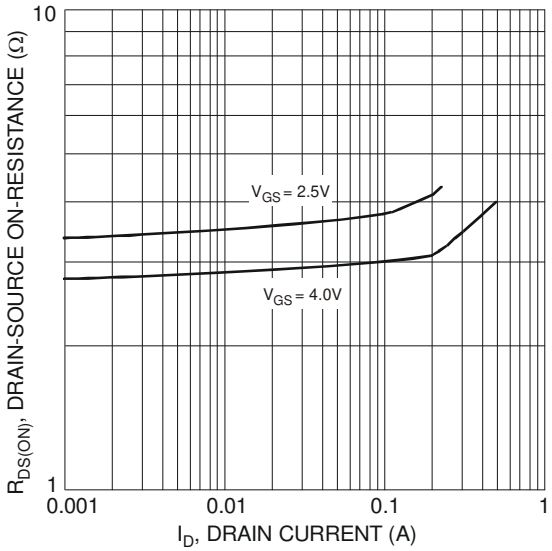


Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

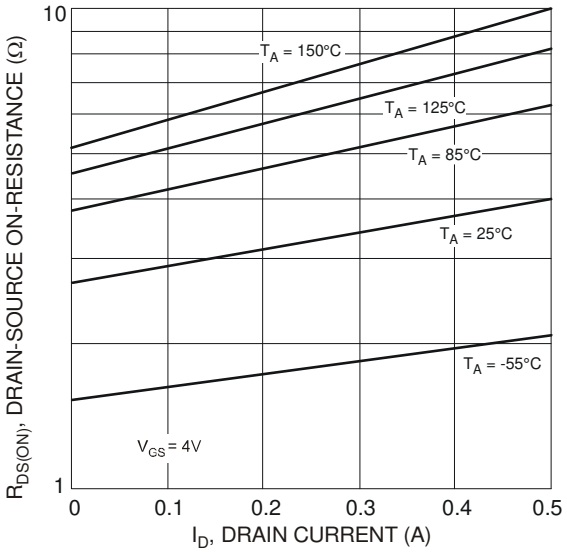


Fig. 4 Typical Drain-Source On-Resistance
vs. Drain Current and Temperature

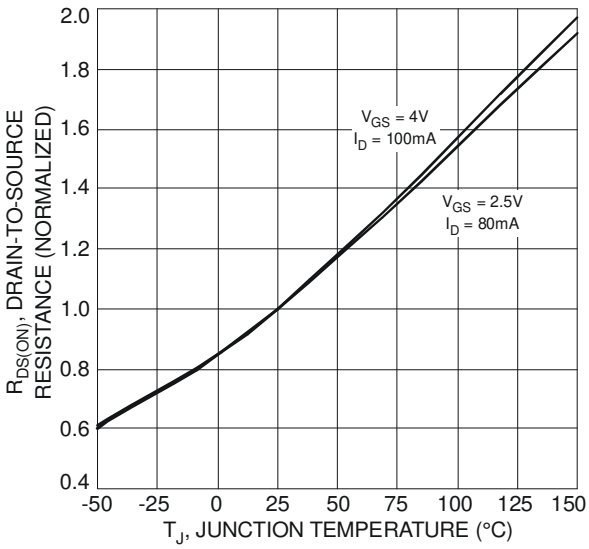


Fig. 5 On-Resistance Variation with Temperature

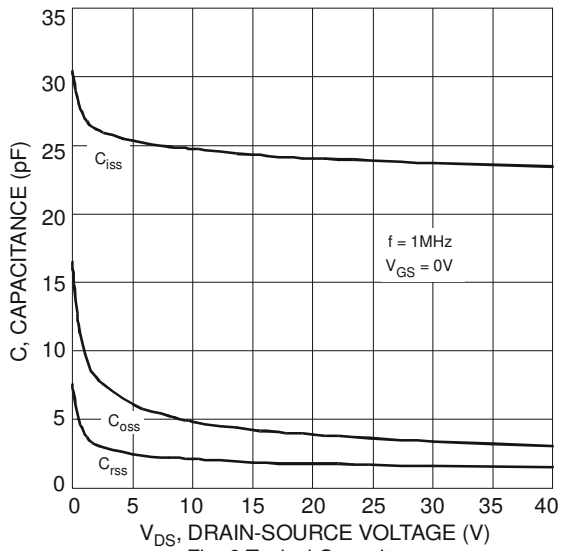


Fig. 6 Typical Capacitance

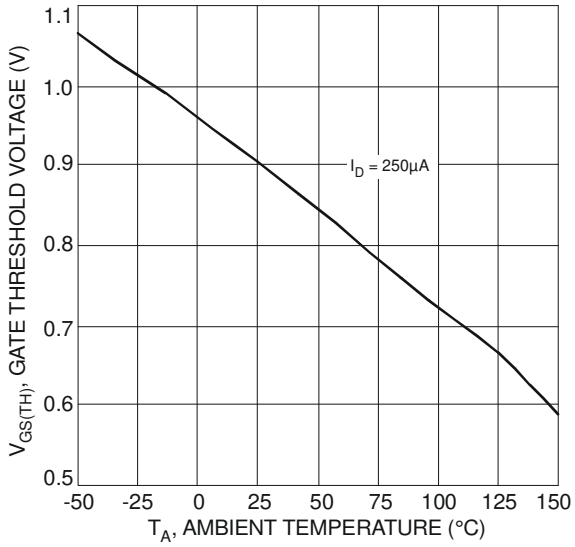


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

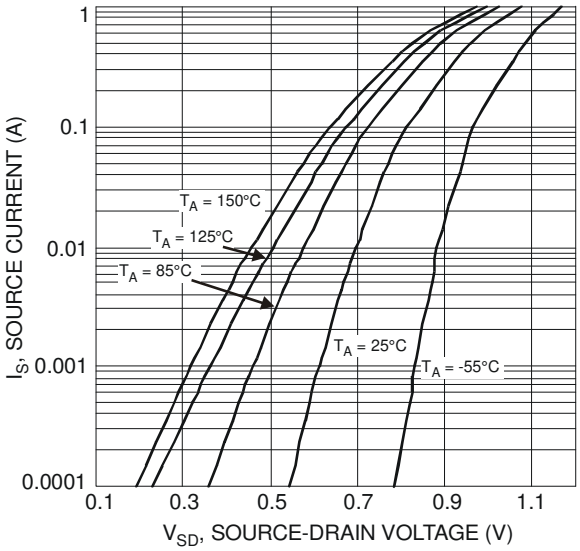


Fig. 8 Diode Forward Voltage vs. Current

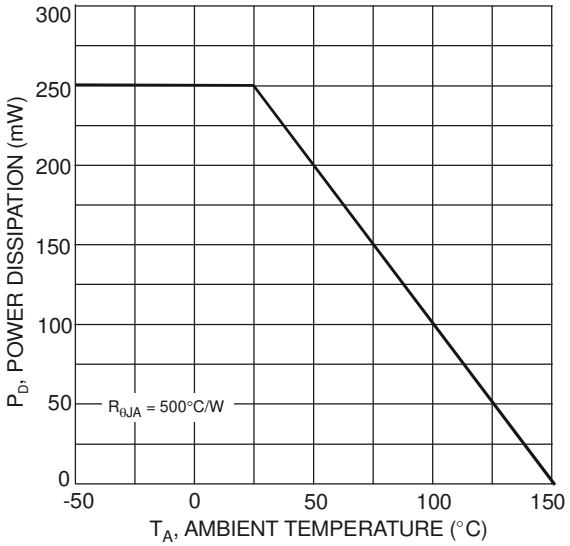


Fig. 9 Derating Curve - Total Package Power Dissipation

NPN Transistor

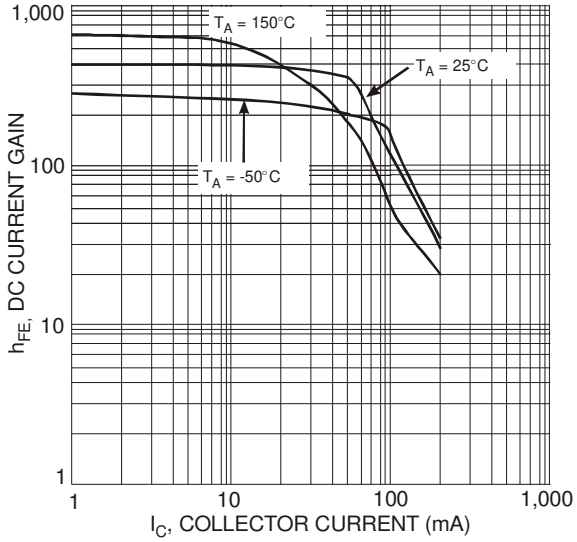


Fig. 10 Typical DC Current Gain vs. Collector Current

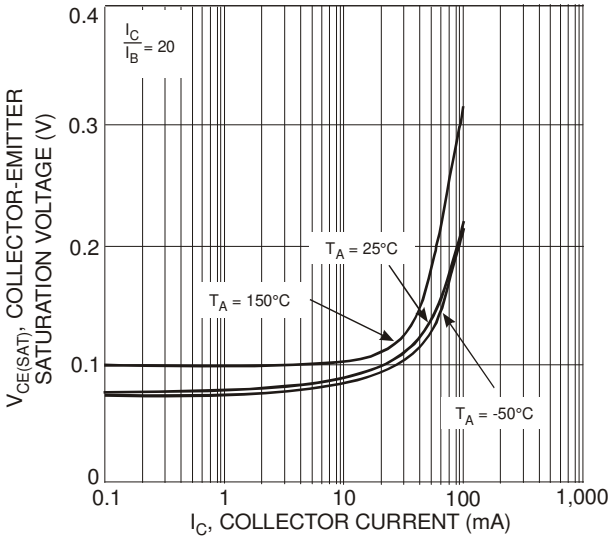


Fig. 11 Typical Collector-Emitter Saturation Voltage vs. Collector Current

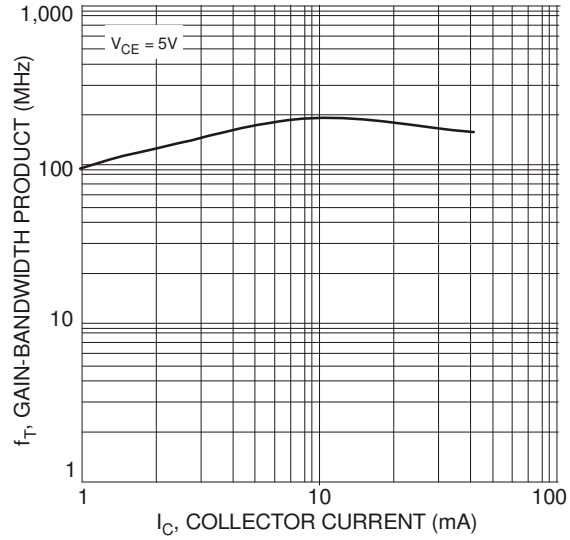
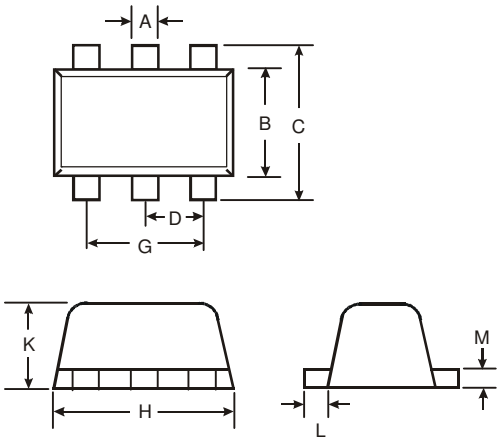


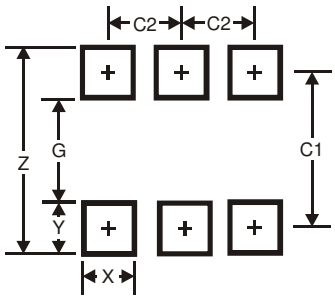
Fig. 12 Typical Gain-Bandwidth Product vs. Collector Current

Package Outline Dimensions



SOT563			
Dim	Min	Max	Typ
A	0.15	0.30	0.20
B	1.10	1.25	1.20
C	1.55	1.70	1.60
D	-	-	0.50
G	0.90	1.10	1.00
H	1.50	1.70	1.60
K	0.55	0.60	0.60
L	0.10	0.30	0.20
M	0.10	0.18	0.11
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
Z	2.2
G	1.2
X	0.375
Y	0.5
C1	1.7
C2	0.5

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