

200V N-Channel Depletion-Mode Power MOSFET

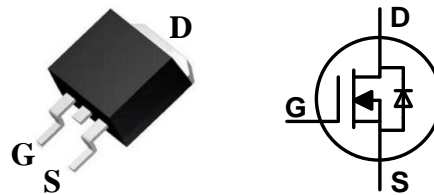
General Features

- Depletion Mode (Normally On)
- Proprietary Advanced Planar Technology
- Rugged Polysilicon Gate Cell Structure
- Fast Switching Speed
- High Power Density
- RoHS Compliant
- Halogen-free Available

BV_{DSX}	$R_{DS(ON)}$ (Max.)	$I_{DSS(Min)}$
200V	80mΩ	16A

Applications

- Suppressing Surge Current
- Start-up Circuits
- Converters
- Synchronous Rectification
- Audio Amplifiers
- Constant Current Source
- Ramp Generators
- Current Regulators
- Protection Circuits

TO-263


Ordering Information

Part Number	Package	Marking	Remark
DMB16C20A	TO-263	16C20	Halogen Free

Absolute Maximum Ratings

 $T_C=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	DMB16C20A	Unit
V_{DSX}	Drain-to-Source Voltage ^[1]	200	V
V_{DGX}	Drain-to-Gate Voltage ^[1]	200	V
P_D	Power Dissipation	230	W
	Derating Factor above 25°C	1.85	W/°C
V_{GS}	Gate-to-Source Voltage	±20	V
T_L	Soldering Temperature	300	°C
	Distance of 1.6mm from case for 10 seconds		
T_J and T_{STG}	Operating and Storage Temperature Range	-55 to 150	

Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device.

Thermal Characteristics

Symbol	Parameter	DMB16C20A	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.54	°C/W

Electrical Characteristics

OFF Characteristics

 $T_J = 25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
BV_{DSX}	Drain-to-Source Breakdown Voltage	200	--	--	V	$V_{GS} = -10\text{V}$, $I_D = 250\mu\text{A}$
$I_{D(OFF)}$	Drain-to-Source Leakage Current	--	--	5	μA	$V_{DS} = 200\text{V}$, $V_{GS} = -10\text{V}$
I_{GSS}	Gate-to-Source Leakage Current	--	--	1	μA	$V_{GS} = +20\text{V}$, $V_{DS} = 0\text{V}$
		--	--	-1		$V_{GS} = -20\text{V}$, $V_{DS} = 0\text{V}$

ON Characteristics

 $T_J = 25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
I_{DSS}	Saturated Drain-to-Source Current	16	--	--	A	$V_{DS} = 25\text{V}$, $V_{GS} = 0\text{V}$
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	--	--	80	m Ω	$V_{GS} = 0\text{V}$, $I_D = 8\text{A}^{[2]}$
$V_{GS(OFF)}$	Gate-to-Source Cut-off Voltage	-4.5	--	-1.6	V	$V_{DS} = 3\text{V}$, $I_D = 4\text{mA}$
gfs	Forward Transconductance	--	12.5	--	S	$V_{DS} = 20\text{V}$, $I_D = 8\text{A}^{[2]}$

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{iss}	Input Capacitance	--	10200	--	pF	$V_{GS} = -10\text{V}$ $V_{DS} = 25\text{V}$ $f = 1.0\text{MHz}$
C_{oss}	Output Capacitance	--	545	--		
C_{rss}	Reverse Transfer Capacitance	--	83	--		
Q_g	Total Gate Charge	--	130	--	nC	$V_{GS} = -6\text{V} \sim 6\text{V}$ $V_{DD} = 100\text{V}$ $I_D = 8\text{A}$
Q_{gs}	Gate-to-Source Charge	--	40	--		
Q_{gd}	Gate-to-Drain (Miller) Charge	--	25	--		

Resistive Switching Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(on)}$	Turn-on Delay Time	--	64	--	ns	$V_{GS} = -6\text{V} \sim 6\text{V}$ $V_{DD} = 100\text{V}$ $I_D = 8\text{A}$ $R_G = 3.3\Omega$
t_{rise}	Rise Time	--	54	--		
$t_{d(off)}$	Turn-off Delay Time	--	133	--		
t_{fall}	Fall Time	--	50	--		

Source-Drain Diode Characteristics

 $T_J = 25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
V_{SD}	Diode Forward Voltage	--	--	1.5	V	$I_{SD} = 8\text{A}^{[2]}$, $V_{GS} = -10\text{V}$

NOTE:

[1] $T_J = +25^\circ\text{C}$ to $+150^\circ\text{C}$

[2] Pulse width $\leq 380\mu\text{s}$; duty cycle $\leq 2\%$.

Typical Characteristics

Figure 1. Maximum Power Dissipation vs. Case Temperature

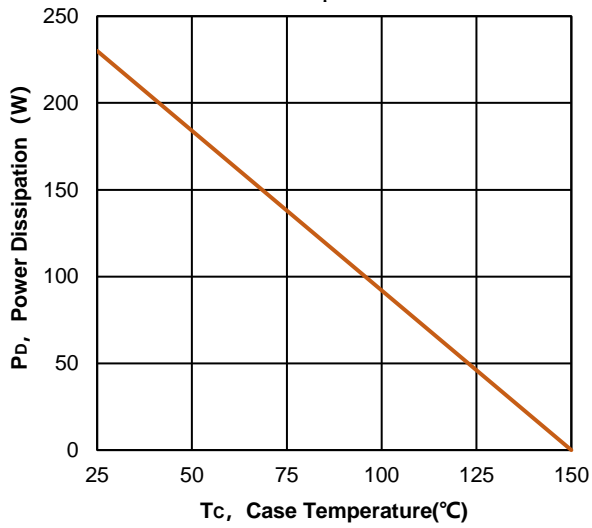


Figure 2. Maximum Continuous Drain Current vs. Case Temperature

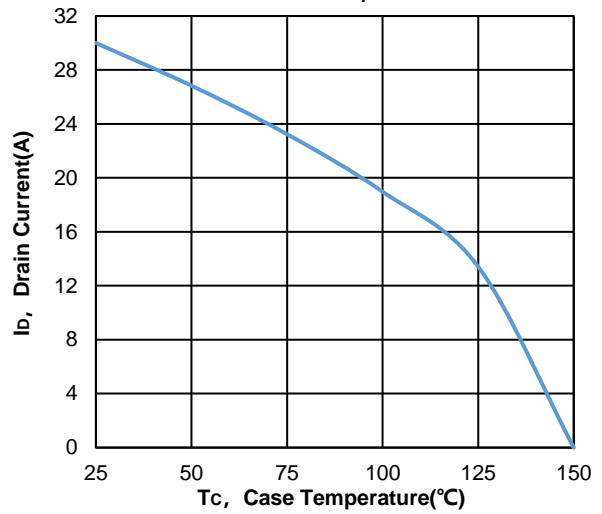


Figure 3. Typical Output Characteristics

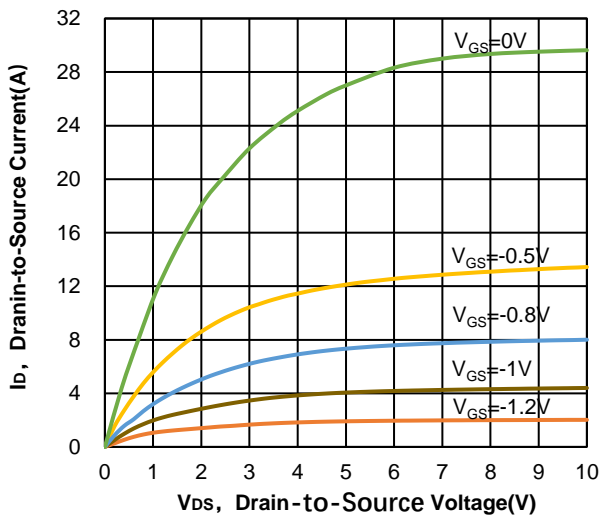


Figure 4. Typical Transfer Characteris

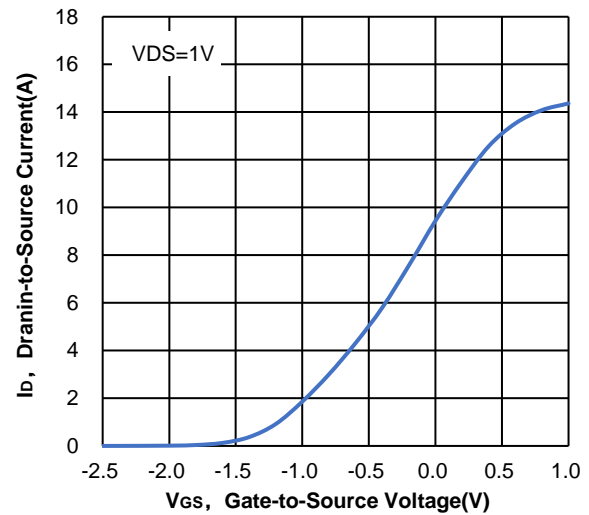


Figure 5. Transconductance

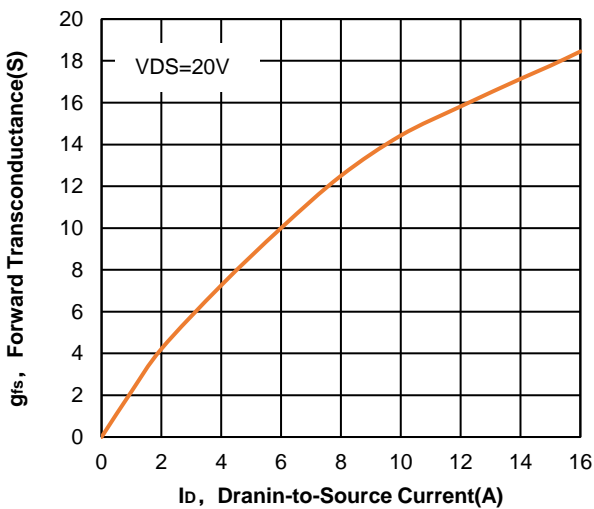


Figure 6. Normalized Breakdown and Threshold Voltages vs. Case Temperature

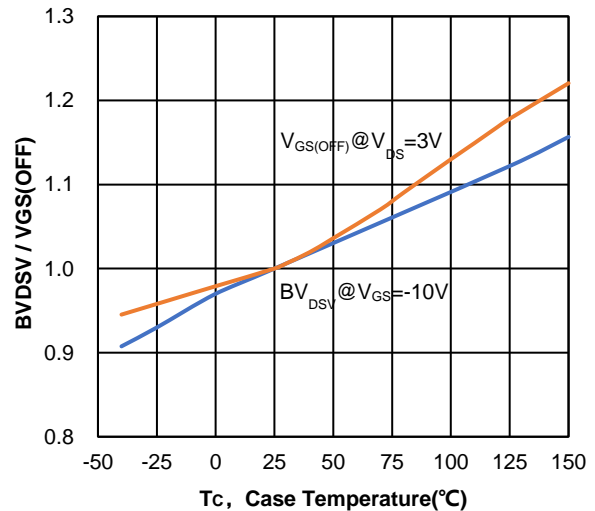
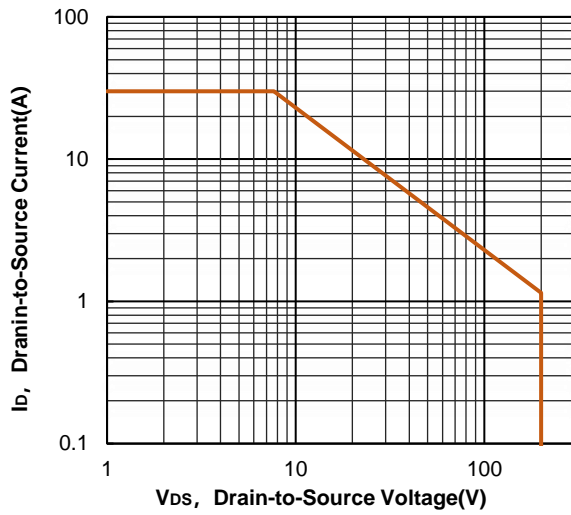
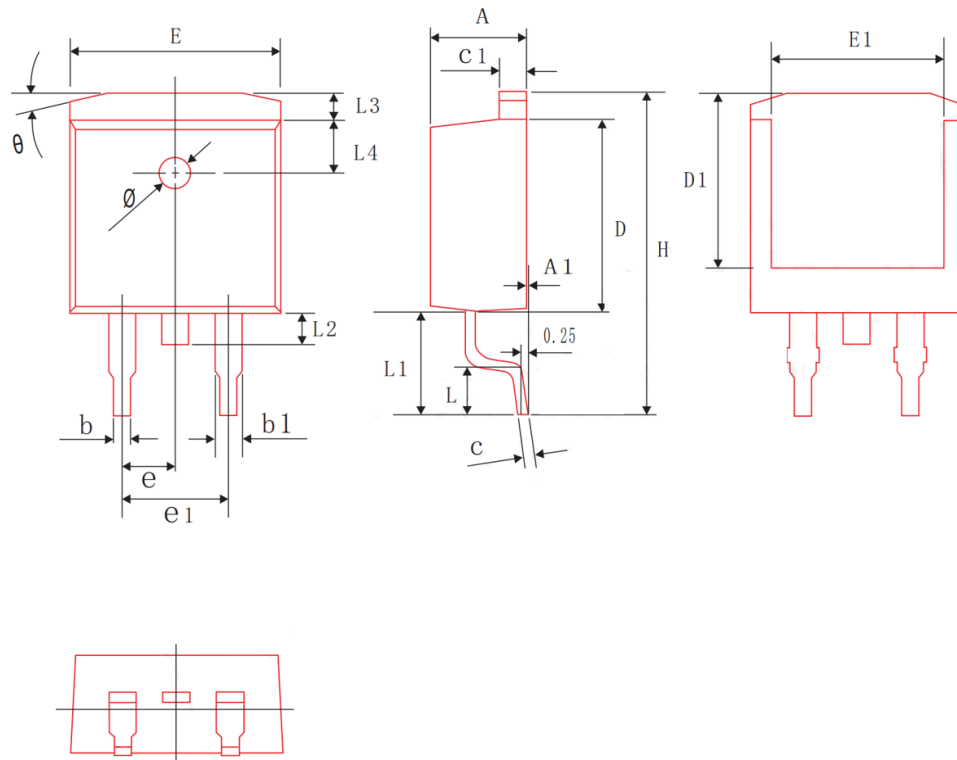


Figure 7. Maximum Rated Safe Operating Area



Package Dimensions
TO-263


COMMON DIMENSIONS (mm)			
SYMBOL	MIN	NOM	MAX
A	4.30	4.50	4.70
A1	0.00	NA	0.25
b	0.70	0.80	0.90
b1	1.20	1.30	1.40
C	0.40	0.47	0.55
C1	1.25	1.30	1.35
D	9.00	9.10	9.20
D1	8.00	8.10	8.20
H	14.9	15.2	15.5
E	9.80	10.0	10.2
E1	7.85	8.00	8.15
e1	4.93	5.08	5.23
L	2.00	2.20	2.45
L1	4.60	4.80	5.00
L2	1.30	1.50	1.70
L3	1.15	1.25	1.35
L4	2.40	2.50	2.60
Ø	1.5 REF		
e	2.54 BSC		
θ	13° TYP		

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