TMMBB040

20V N+P Dual Channel MOSFETs

General Description

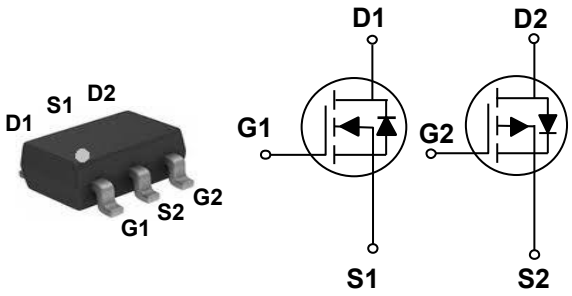
These N+P dual Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications

BV_{DSS}	$R_{DS(ON)}$	I_D
20 V	40 mΩ	3.8 A
-20 V	100 mΩ	-2.5 A

Features

- Fast switching
- Green Device Available
- Suit for 1.8V Gate Drive Applications

SOT-23-6 Pin Configuration



Applications

- Notebook
- Load Switch
- Networking
- Hand-Held Instruments

Absolute Maximum Ratings T_C=25°C unless otherwise noted

Symbol	Parameter	Rating		Units
V_{DS}	Drain-Source Voltage	20	-20	V
V_{GS}	Gate-Source Voltage	±10	±10	V
I_D	Drain Current - Continuous (T_C=25°C)	3.8	-2.5	A
	Drain Current - Continuous (T_C=100°C)	2.3	-1.5	A
I_{DM}	Drain Current - Pulsed (NOTE 1)	15.2	-10	A
P_D	Power Dissipation (T_C=25°C)	1.25		W
T_J	Operating Junction Temperature Range	-55 to 150		°C
T_{STG}	Storage Temperature Range	-55 to 150		°C
Marking Code		c		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	---	100	°C/W

N Channel Electrical Characteristics (T_J=25°C, unless otherwise noted)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	20	---	---	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=20V , V_{GS}=0V , T_J=25°C	---	---	1	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±10V , V_{DS}=0V	---	---	±100	nA

On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=4.5V , I_D=3A	---	---	40	mΩ
		V_{GS}=2.5V , I_D=2A	---	---	55	
		V_{GS}=1.8V , I_D=1.5A	---	---	70	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D=250uA	0.3	0.6	1.0	V
gfs	Forward Transconductance	V_{DS}=10V , I_D=2A	---	4.4	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q_g	Total Gate Charge	V_{DS}=10V , V_{GS}=4.5V , I_D=3A (NOTE 2、3)	---	5.8	---	nC
Q_{gs}	Gate-Source Charge		---	0.6	---	
Q_{gd}	Gate-Drain Charge		---	1.5	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=10V , V_{GS}=4.5V , R_G=25Ω , I_D=1A (NOTE 2、3)	---	2.9	---	nS
T_r	Rise Time		---	8.4	---	
$T_{d(off)}$	Turn-Off Delay Time		---	19.2	---	
T_f	Fall Time		---	5.6	---	
C_{iss}	Input Capacitance	V_{DS}=15V , V_{GS}=0V , F=1MHz	---	315	---	pF
C_{oss}	Output Capacitance		---	50	---	
C_{rss}	Reverse Transfer Capacitance		---	40	---	

Drain-Source Diode Characteristics and Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	3.8	A
I_{SM}	Pulsed Source Current		---	---	7.6	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=1A , T_J=25°C	---	---	1	V

Characteristics Curves

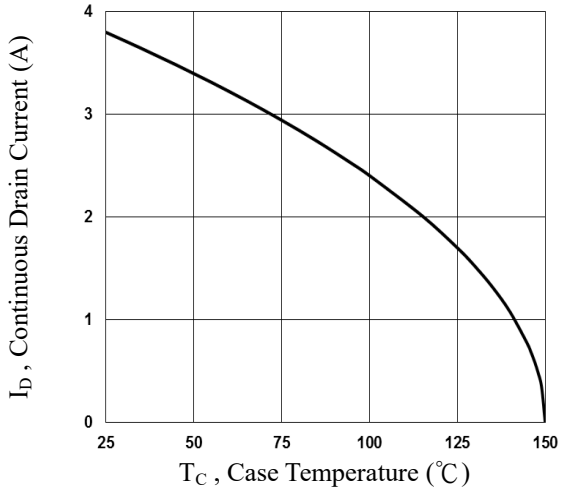


Fig.1 Continuous Drain Current vs. T_c

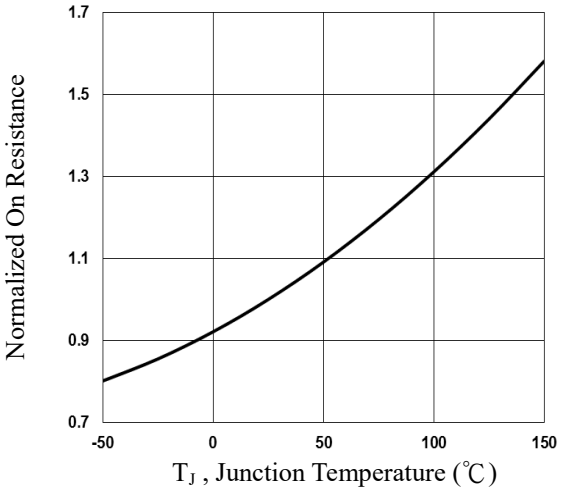


Fig.2 Normalized RDSON vs. T_J

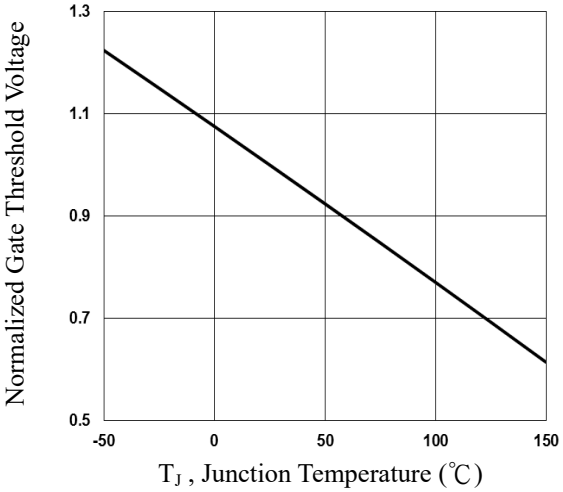


Fig.3 Normalized V_{th} vs. T_J

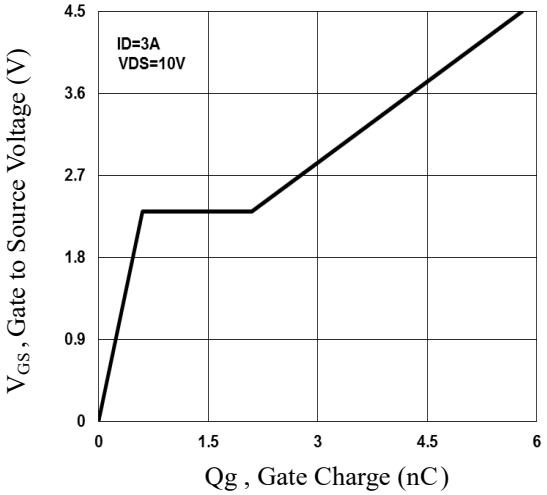


Fig.4 Gate Charge Waveform

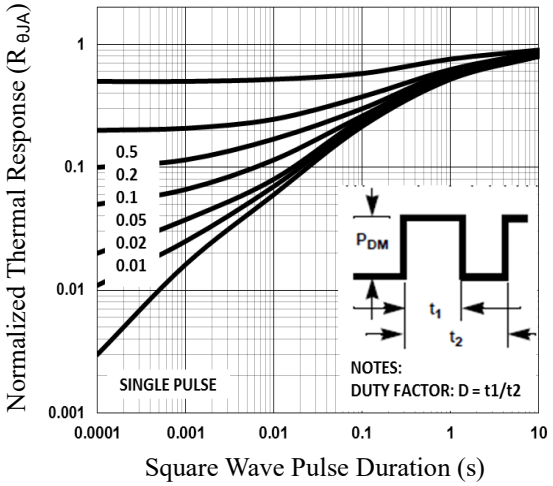


Fig.5 Normalized Transient Impedance

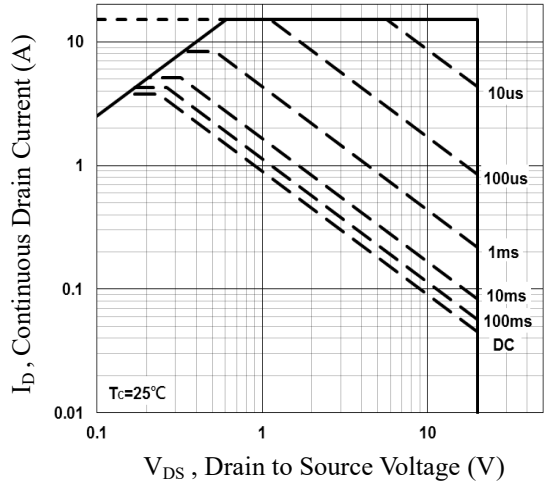


Fig.6 Maximum Safe Operation Area

Characteristics Curves

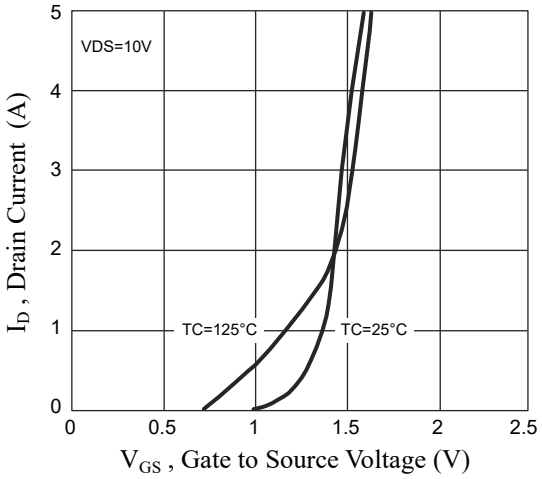


Fig.7 Transfer Characteristics

P Channel Electrical Characteristics (T_J=25°C, unless otherwise noted)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}= 0V , I_D= -250uA	-20	---	---	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}= -20V , V_{GS}= 0V , T_J=25°C	---	---	-1	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}= ±10V , V_{DS}= 0V	---	---	±100	nA

On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}= -4.5V , I_D= -3A	---	---	100	mΩ
		V_{GS}= -2.5V , I_D= -2A	---	---	140	
		V_{GS}= -1.8V , I_D= -1A	---	---	230	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D= -250uA	-0.3	-0.6	-1.0	V
gfs	Forward Transconductance	V_{DS}=-10V , I_D=-1A	---	2.2	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q_g	Total Gate Charge	V_{DS}= -10V , V_{GS}= -4.5V , I_D= -2A (NOTE 2、3)	---	4.8	---	nC
Q_{gs}	Gate-Source Charge		---	0.5	---	
Q_{gd}	Gate-Drain Charge		---	1.9	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}= -10V , V_{GS}= -4.5V , R_G=25Ω , I_D= -1A (NOTE 2、3)	---	3.5	---	nS
T_r	Rise Time		---	12.6	---	
$T_{d(off)}$	Turn-Off Delay Time		---	32.6	---	
T_f	Fall Time		---	8.4	---	
C_{iss}	Input Capacitance	V_{DS}= -15V , V_{GS}= 0V , F= 1MHz	---	350	---	pF
C_{oss}	Output Capacitance		---	65	---	
C_{rss}	Reverse Transfer Capacitance		---	50	---	

Drain-Source Diode Characteristics and Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	-2.5	A
I_{SM}	Pulsed Source Current		---	---	-5	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S= -1A , T_J=25°C	---	---	-1	V

NOTES：

1. Repetitive Rating：Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
3. Essentially independent of operating temperature.

Characteristics Curves

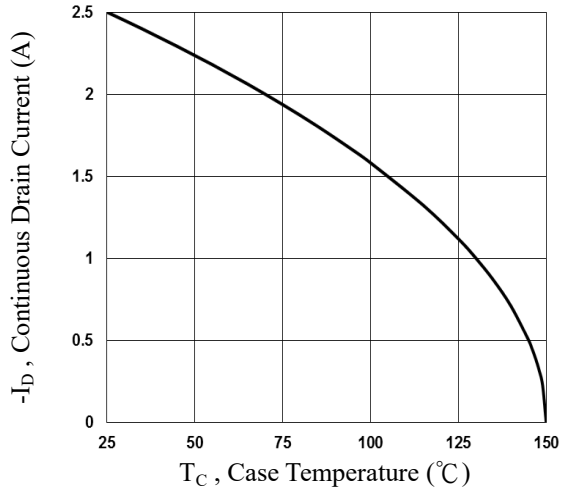


Fig.8 Continuous Drain Current vs. T_C

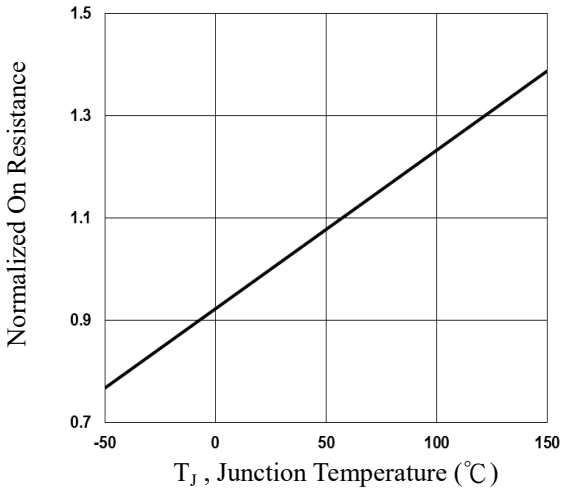


Fig.9 Normalized RDSON vs. T_J

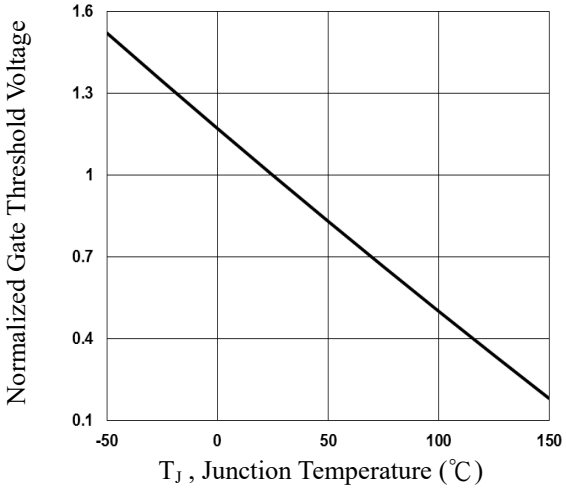


Fig.10 Normalized V_{th} vs. T_J

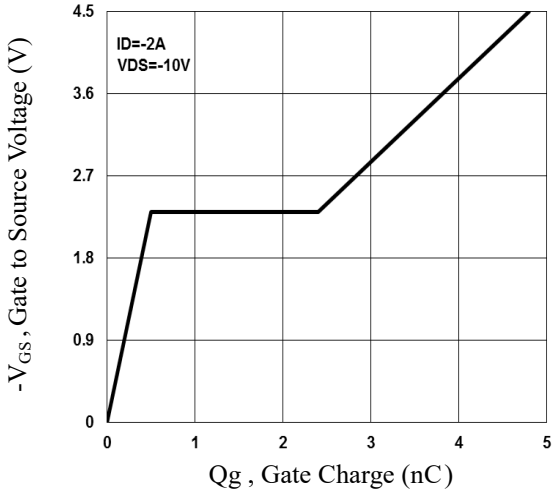


Fig.11 Gate Charge Waveform

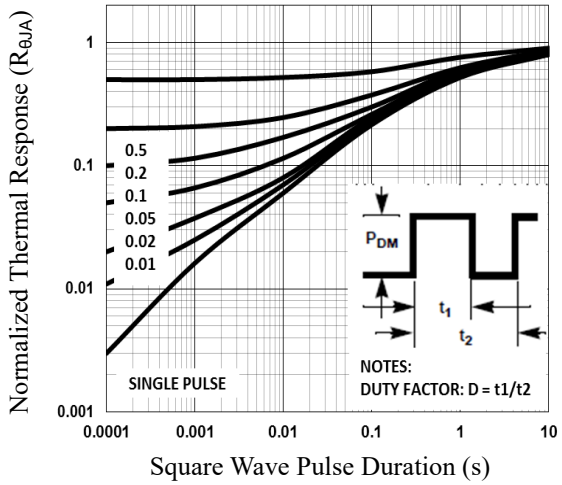


Fig.12 Normalized Transient Impedance

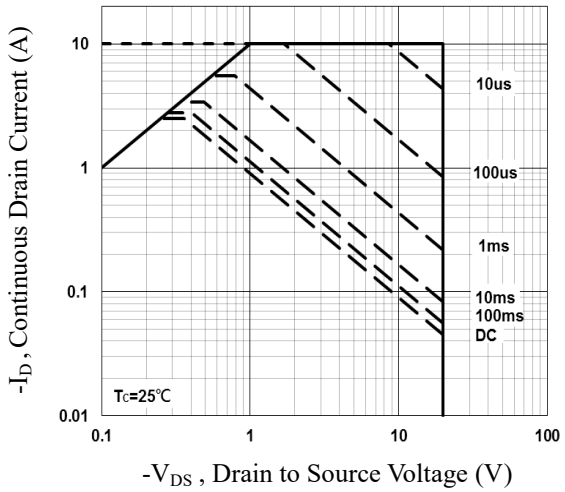


Fig.13 Maximum Safe Operation Area

Characteristics Curves

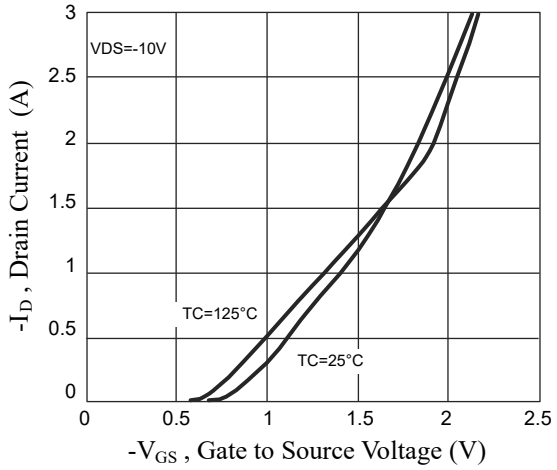
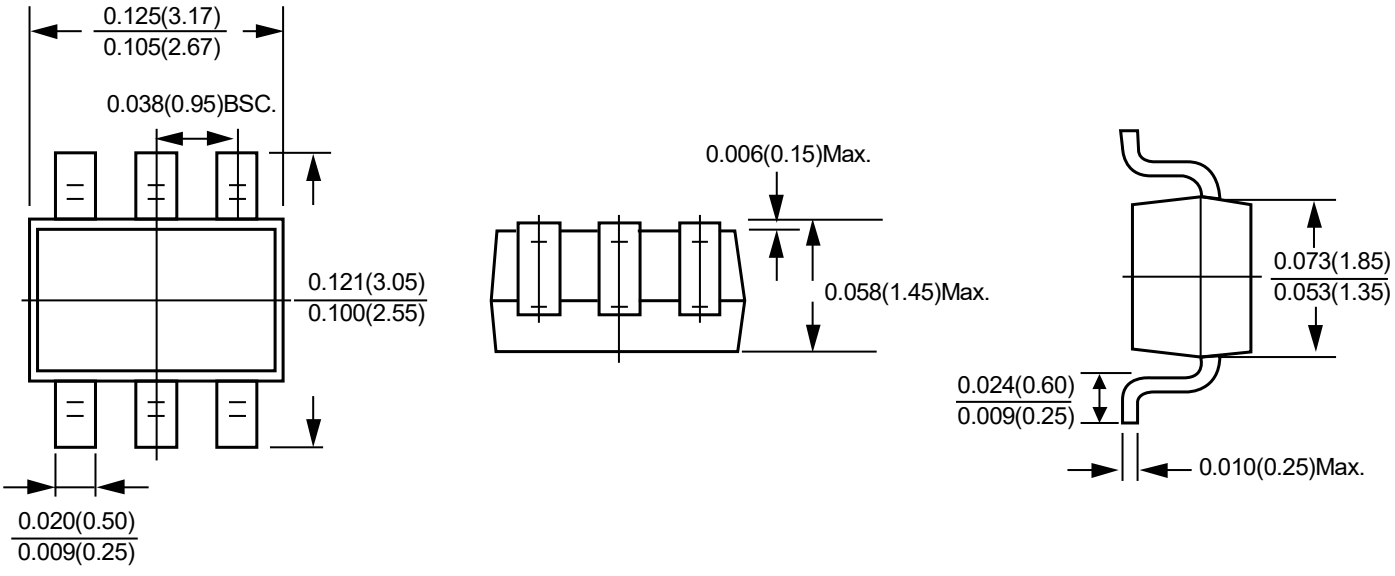


Fig.14 Transfer Characteristics

Package Outline Dimensions



SOT-23-6

Dimensions in inches and (millimeters)

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