



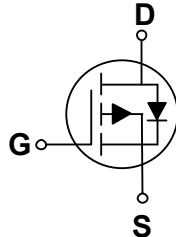
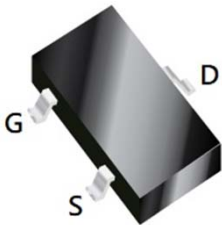
### General Description

The TLMPB045 is the high cell density trench P-ch MOSFETs, which provide excellent  $R_{DS(ON)}$  and gate charge for most of the synchronous buck converter applications.

The TLMPB045 meets the RoHS and Green Product requirement with full function reliability approved.

$BV_{DSS}$	$R_{DS(ON)}$	$I_D$
20 V	45 m $\Omega$	4.9 A

SOT-23S Pin Configuration



### Features

- -20V, -4.9A,  $R_{DS(ON)} \leq 45m\Omega @ V_{GS} = -4.5V$
- Super Low Gate Charge
- Excellent Cdv/dt effect decline
- Green Device Available
- Advanced high cell density Trench technology

### Absolute Maximum Ratings $T_C=25^\circ C$ unless otherwise noted

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	V
$I_D$	Drain Current - Continuous, $V_{GS}@-4.5V$ (NOTE 1) ( $T_A=25^\circ C$ )	-4.9	A
	Drain Current - Continuous, $V_{GS}@-4.5V$ (NOTE 1) ( $T_A=70^\circ C$ )	-3.9	A
$I_{DM}$	Drain Current - Pulsed (NOTE 2)	-14	A
$P_D$	Total Power Dissipation (NOTE 3) ( $T_A=25^\circ C$ )	1.31	W
	Total Power Dissipation (NOTE 3) ( $T_A=70^\circ C$ )	0.84	W
$T_J$	Operating Junction Temperature Range	-50 to 150	$^\circ C$
$T_{STG}$	Storage Temperature Range	-50 to 150	$^\circ C$
Marking Code		B	

### Thermal Characteristics

Symbol	Parameter	Typ.	Max	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient (NOTE 1)	---	120	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient ( $t \leq 10s$ ) (NOTE 1)	---	95	$^\circ C/W$



**Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)**

**Off Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0V , I <sub>D</sub> = -250uA	-20	---	---	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> = -16V , V <sub>GS</sub> = 0V , T <sub>J</sub> =25°C	---	---	-1	uA
		V <sub>DS</sub> = -16V , V <sub>GS</sub> = 0V , T <sub>J</sub> =55°C	---	---	-5	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> = ±12V , V <sub>DS</sub> = 0V	---	---	±100	nA

**On Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance (NOTE 2)	V <sub>GS</sub> = -4.5V , I <sub>D</sub> = -4.9A	---	40	45	mΩ
		V <sub>GS</sub> = -2.5V , I <sub>D</sub> = -3.4A	---	50	60	
		V <sub>GS</sub> = -1.8V , I <sub>D</sub> = -2A	---	65	85	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> = -250uA	-0.4	---	-1.0	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> = -5V , I <sub>D</sub> = -3A	---	12.8	---	S

**Dynamic and switching Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = -15V , V <sub>GS</sub> = -4.5V , I <sub>D</sub> = -3A	---	10.2	14.3	nC
Q <sub>gs</sub>	Gate-Source Charge		---	1.89	2.6	
Q <sub>gd</sub>	Gate-Drain Charge		---	3.1	4.3	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> = -10V , V <sub>GS</sub> = -4.5V , R <sub>G</sub> = 3.3Ω , I <sub>D</sub> = -3A	---	5.6	11.2	ns
T <sub>r</sub>	Rise Time		---	40.8	73	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	33.6	67	
T <sub>f</sub>	Fall Time		---	18	36	
C <sub>ISS</sub>	Input Capacitance	V <sub>DS</sub> = -15V , V <sub>GS</sub> = 0V , F= 1MHz	---	857	1200	pF
C <sub>OSS</sub>	Output Capacitance		---	114	160	
C <sub>rSS</sub>	Reverse Transfer Capacitance		---	108	151	

**Drain-Source Diode Characteristics and Ratings**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current (NOTE 1 · 4)	V <sub>G</sub> = V <sub>D</sub> = 0V , Force Current	---	---	-4.9	A
V <sub>SD</sub>	Diode Forward Voltage (NOTE 2)	V <sub>GS</sub> = 0V , I <sub>S</sub> = -1A , T <sub>J</sub> = 25°C	---	---	-1	V
t <sub>rr</sub>	Reverse Recovery Time	IF= -3A , di/dt=100A/us , T <sub>J</sub> = 25°C	---	21.8	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	6.9	---	nC

NOTES :

1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2oz copper.
2. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
3. The power dissipation is limited by 150°C junction temperature.
4. The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.



Characteristics Curves

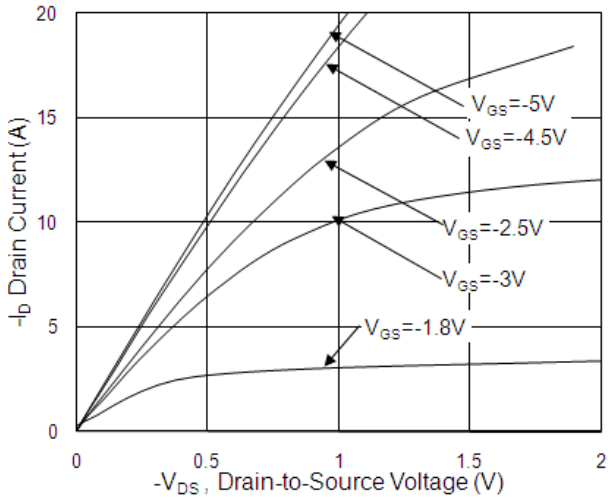


Fig.1 Typical Output Characteristics

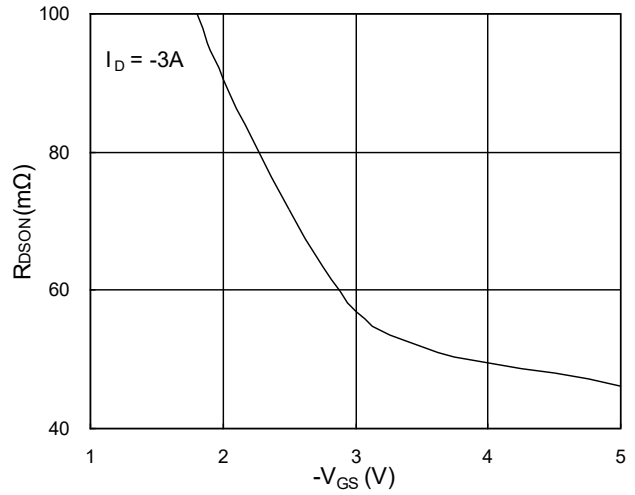


Fig.2 On-Resistance vs. G-S Voltage

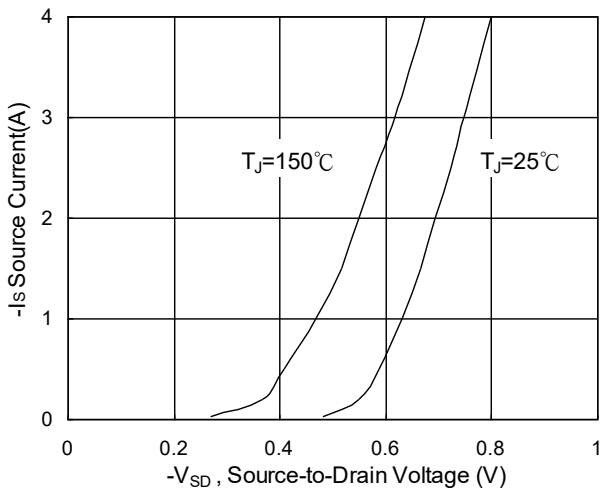


Fig.3 Source Drain Forward Characteristics

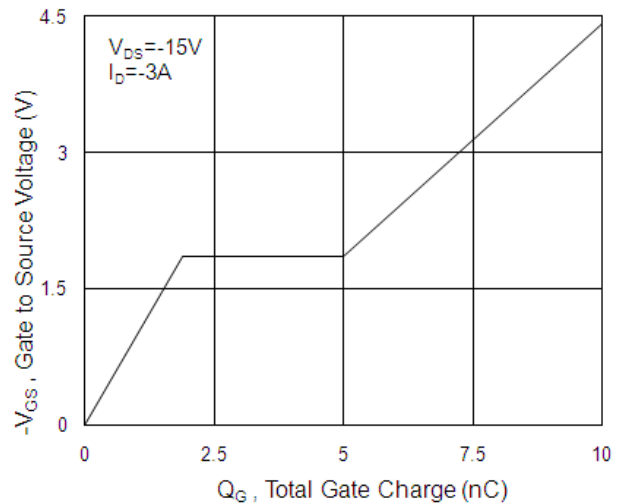


Fig.4 Gate-charge Characteristics

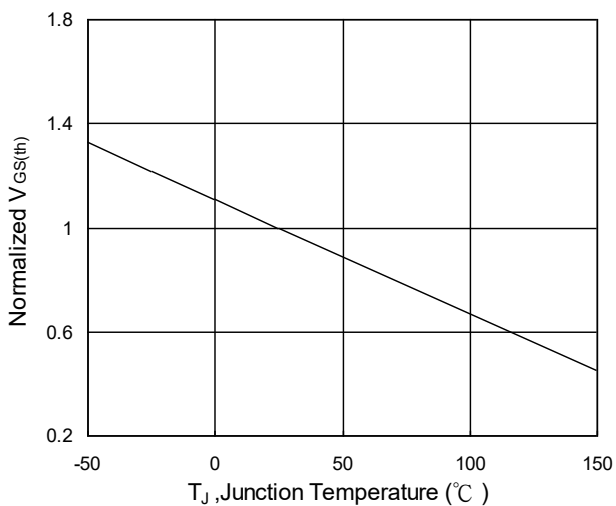


Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$

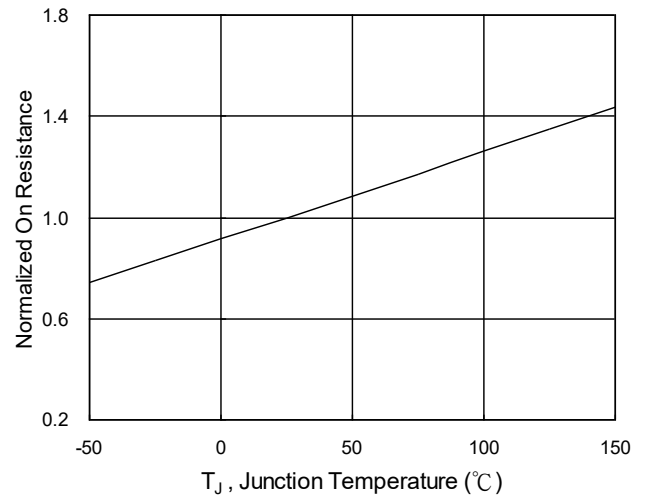


Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$



Characteristics Curves

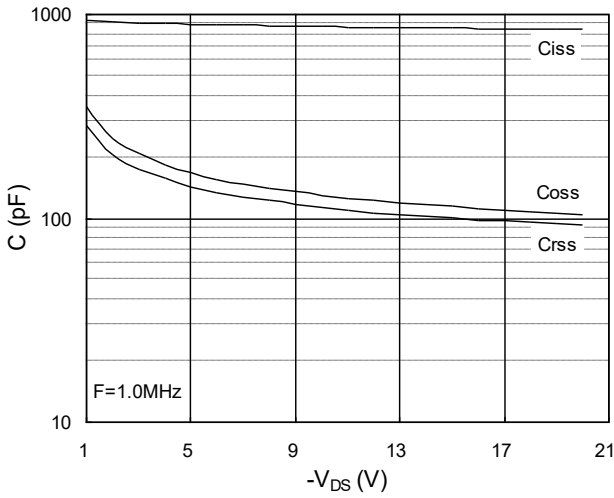


Fig.7 Capacitance

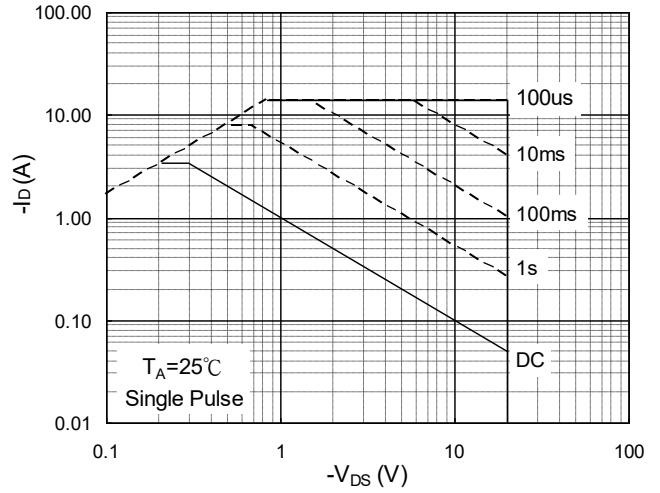


Fig.8 Safe Operating Area

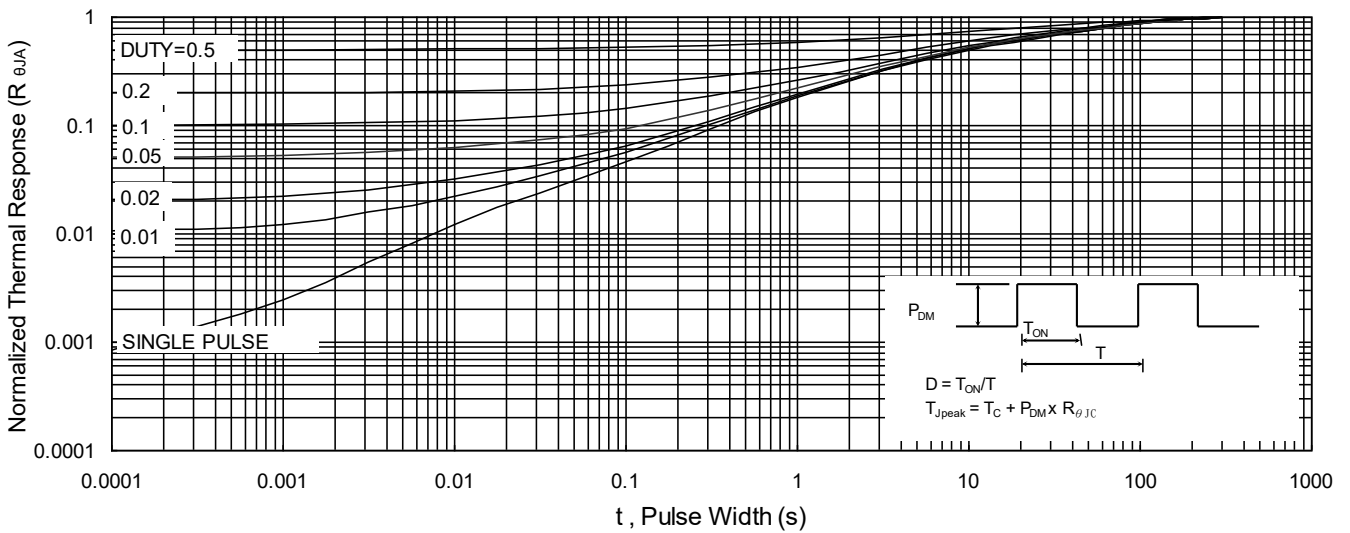


Fig.9 Normalized Maximum Transient Thermal Impedance

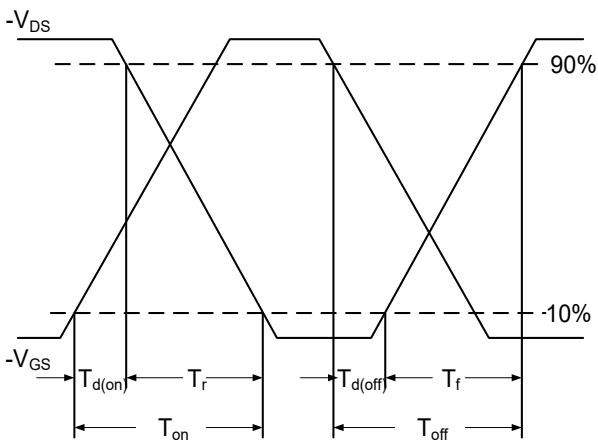


Fig.10 Switching Time Waveform

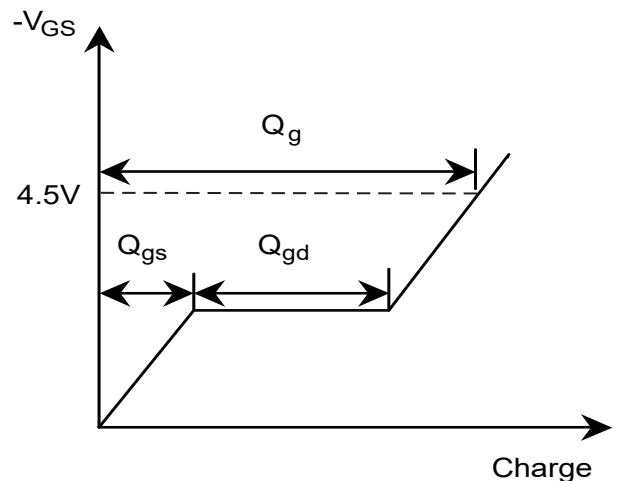
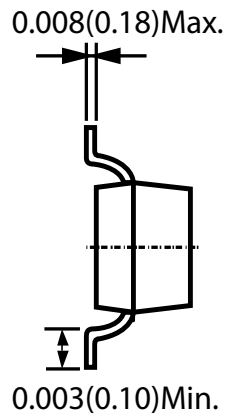
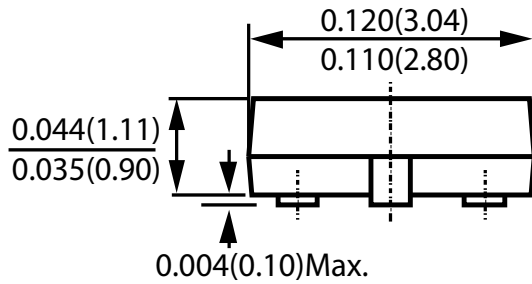
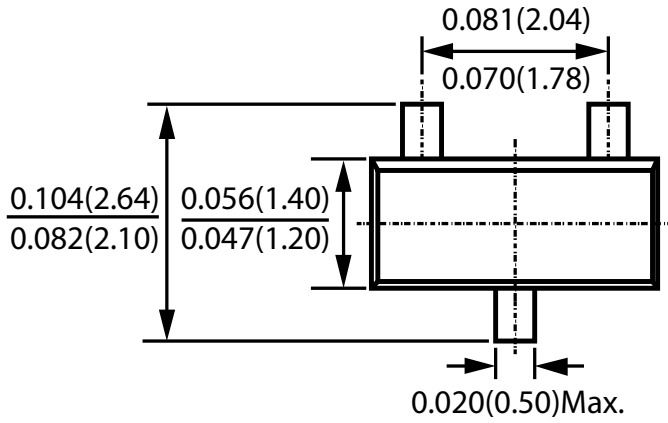


Fig.11 Gate Charge Waveform



Package Outline Dimensions



SOT-23S

Dimensions in inches and (millimeters)



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