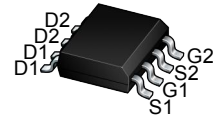


Description

The TX4606BS uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.



SOP-8

General Features

$V_{DS} = 20V$ $I_D = 6A$

$R_{DS(ON)} < 27m\Omega$ @ $V_{GS}=4.5V$

$V_{DS} = -20V$ $I_D = -5A$

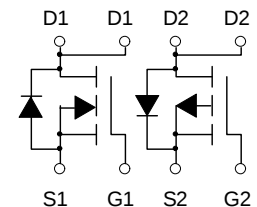
$R_{DS(ON)} < 70 m\Omega$ @ $V_{GS}=-4.5V$

Application

Wireless charging

Boost driver

Brushless motor



N-Channel and P-Channel

Absolute Maximum Ratings ($T_c=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Rating		Units
		N-Channel	P-Channel	
V_{DS}	Drain-Source Voltage	20	-20	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
$I_{D@T_A=25^\circ C}$	Continuous Drain Current, V_{GS} @ 10V ¹	6	-5	A
$I_{D@T_A=70^\circ C}$	Continuous Drain Current, V_{GS} @ 10V ¹	5	-4	A
I_{DM}	Pulsed Drain Current ²	20	-12	A
E_{AS}	Single Pulse Avalanche Energy ³	72	59	mJ
$P_{D@T_A=25^\circ C}$	Total Power Dissipation ⁴	2.5	2.08	W
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	85		$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	50		$^\circ C/W$

Electrical Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	20	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =20V, V _{GS} =0V,	-	-	1.0	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} =±12V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	0.4	0.7	1	V
R _{DS(on)}	Static Drain-Source on-Resistance note2	V _{GS} =4.5V, I _D =4A	-	21	27	mΩ
		V _{GS} =2.5V, I _D =3A	-	29	44	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, f=1.0MHz	-	358	-	pF
C _{oss}	Output Capacitance		-	69.3	-	pF
C _{rss}	Reverse Transfer Capacitance		-	58.5	-	pF
Q _g	Total Gate Charge	V _{DS} =10V, I _D =2A, V _{GS} =4.5V	-	5.6	-	nC
Q _{gs}	Gate-Source Charge		-	0.8	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	1	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DS} =10V, I _D =4A, R _{GEN} =3Ω, V _{GS} =4.5V	-	5	-	ns
t _r	Turn-on Rise Time		-	30	-	ns
t _{d(off)}	Turn-off Delay Time		-	48	-	ns
t _f	Turn-off Fall Time		-	36	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	4	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	16	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S =4A	-	-	1.2	V

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

Electrical Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D = -250μA	-20	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -20V, V _{GS} =0V,	-	-	-1	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} = ±12V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D = -250μA	-0.5	-0.7	-1.0	V
R _{DS(on)}	Static Drain-Source on-Resistance note2	V _{GS} = -4.5V, I _D = -3A	-	52	70	mΩ
		V _{GS} = -2.5V, I _D = -2A	-	70	100	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = -10V, V _{GS} =0V, f=1.0MHz	-	503	-	pF
C _{oss}	Output Capacitance		-	67	-	pF
C _{rss}	Reverse Transfer Capacitance		-	58	-	pF
Q _g	Total Gate Charge	V _{DS} = -10V, I _D = -2A, V _{GS} = -4.5V	-	4.1	-	nC
Q _{gs}	Gate-Source Charge		-	0.8	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	1.1	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} = -10V, I _D = -3A, R _G =1Ω, V _{GEN} = -4.5V, R _L =1.2Ω	-	11	-	ns
t _r	Turn-on Rise Time		-	52	-	ns
t _{d(off)}	Turn-off Delay Time		-	16	-	ns
t _f	Turn-off Fall Time		-	10	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-3	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-12	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S = -3A	-	-	-1.2	V

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

Typical Performance Characteristics

P-Channel Typical Characteristics

Figure 1: Output Characteristics

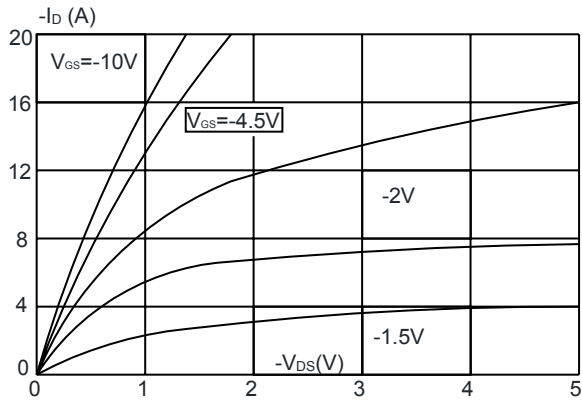


Figure 2: Typical Transfer Characteristics

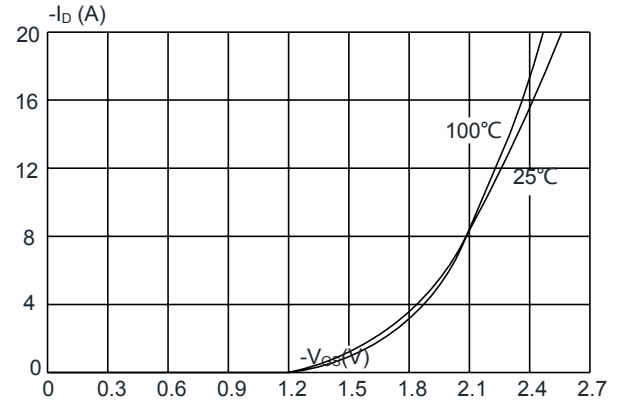


Figure 3: On-resistance vs. Drain Current

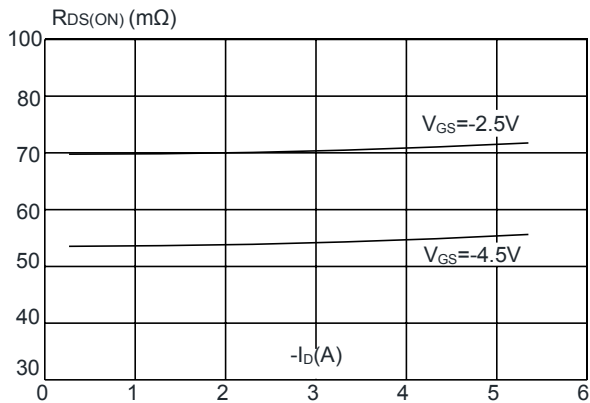


Figure 4: Body Diode Characteristics

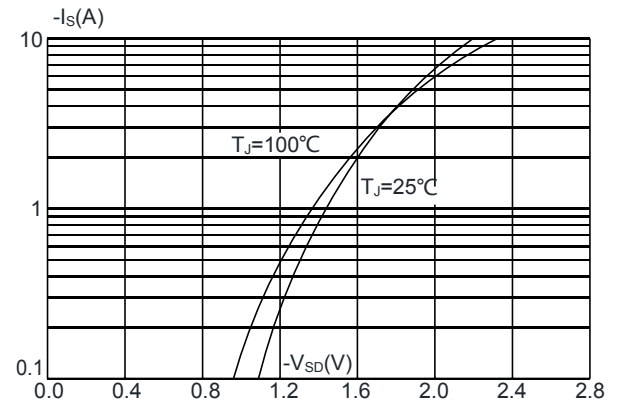


Figure 5: Gate Charge Characteristics

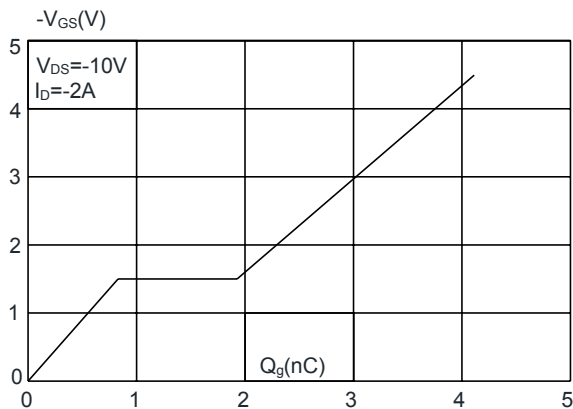
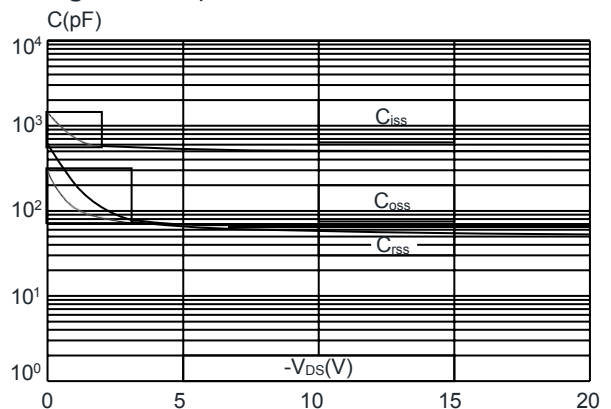


Figure 6: Capacitance Characteristics



Typical Performance Characteristics

N-Channel Typical Characteristics

Figure1: Output Characteristics

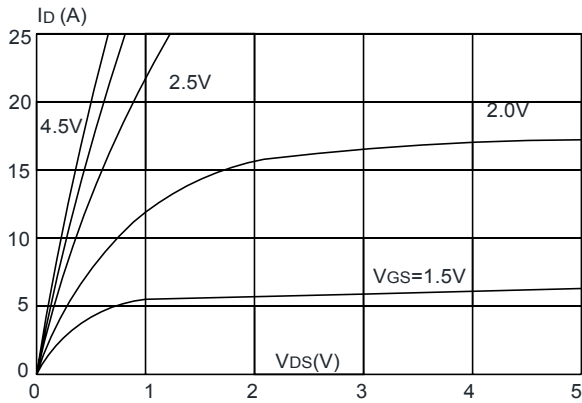


Figure 2: Typical Transfer Characteristics

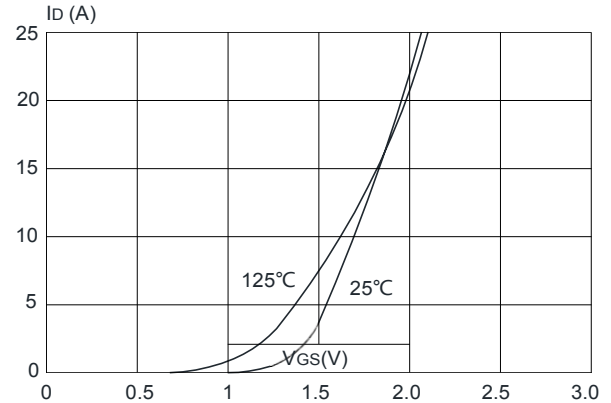


Figure 3: On-resistance vs. Drain Current

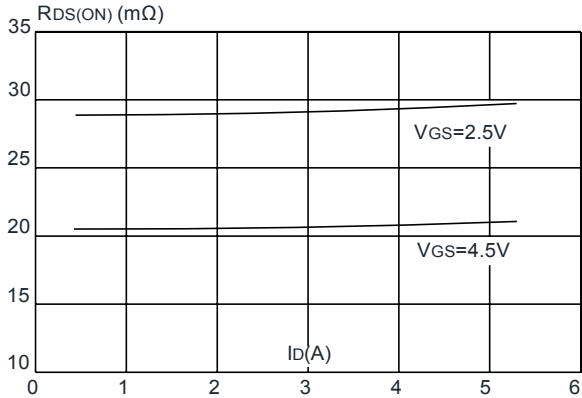


Figure 4: Body Diode Characteristics

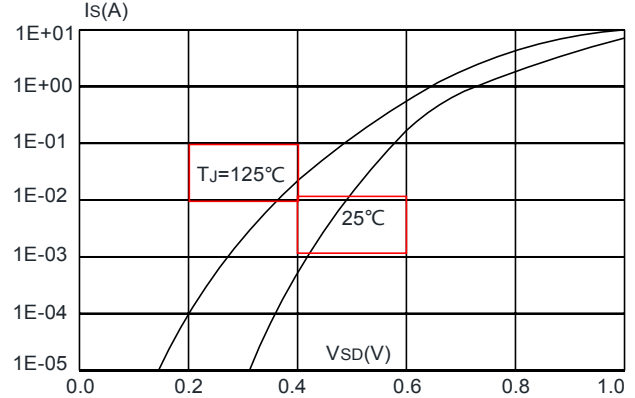


Figure 5: Gate Charge Characteristics

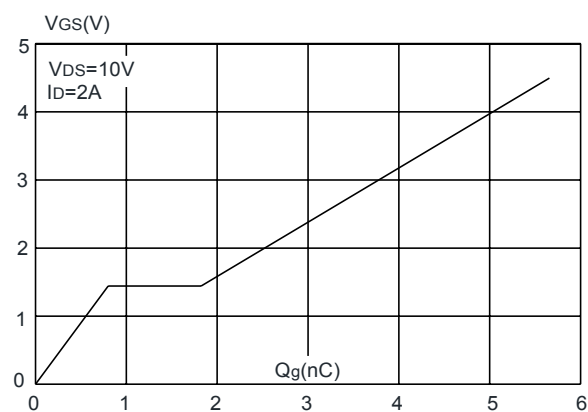
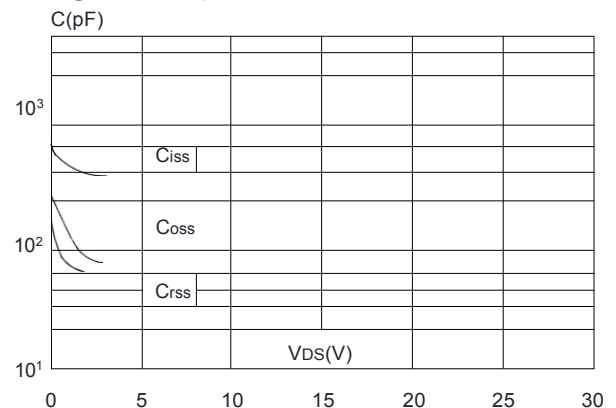
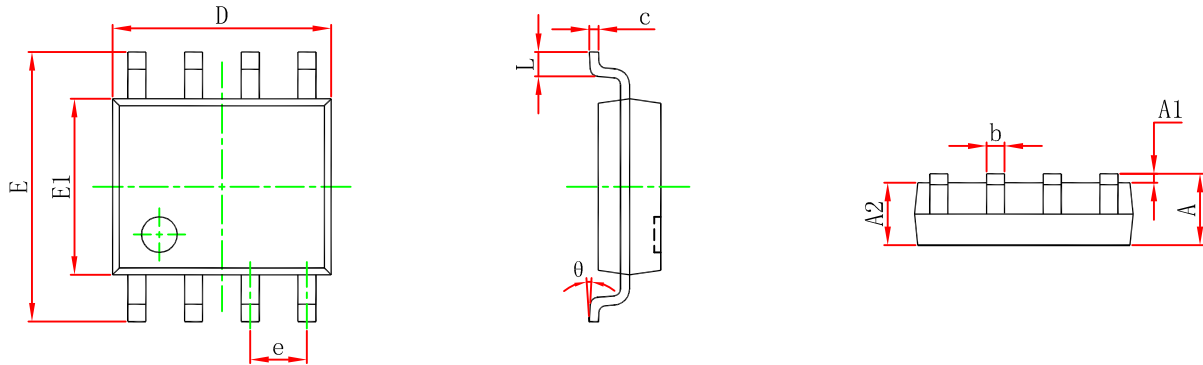


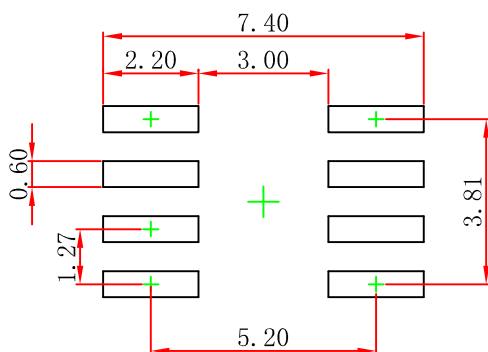
Figure 6: Capacitance Characteristics



SOP-8 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.800	5.000	0.189	0.197
e	1.270 (BSC)		0.050 (BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



Note:
1. Controlling dimension: in millimeters.
2. General tolerance: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.

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