

## Dual P-channel Enhancement Mode Power MOSFET

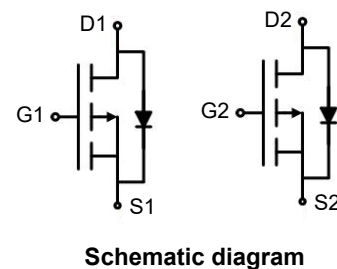
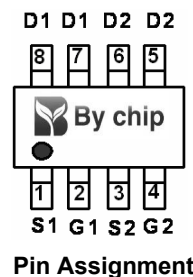
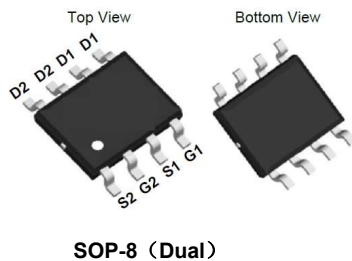
### Features

- $V_{DS} = -20V$ ,  $I_D = -13 A$   
 $R_{DS(ON)} < 15m\Omega @ V_{GS} = -10V$   
 $R_{DS(ON)} < 20m\Omega @ V_{GS} = -4.5V$

### General Features

- Advanced Trench Technology
- Provide Excellent  $R_{DS(ON)}$  and Low Gate Charge
- Lead Free and Green Available

100% UIS TESTED!  
 100%  $\Delta V_{ds}$  TESTED!



### Maximum ratings, at $T_A = 25^\circ C$ , unless otherwise specified

Symbol	Parameter	Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage	-20	V
$V_{GS}$	Gate-Source voltage	$\pm 12$	V
$I_S$	Diode continuous forward current	$T_A = 25^\circ C$ -2.6	A
$I_D$	Continuous drain current@ $V_{GS} = -4.5V$	$T_A = 25^\circ C$ -13	A
		$T_A = 70^\circ C$ -10	A
$I_{DM}$	Pulse drain current tested ①	$T_A = 25^\circ C$ -52	A
$E_{AS}$	Avalanche energy, single pulsed ②	42	mJ
$P_D$	Maximum power dissipation	$T_A = 25^\circ C$ 3.1	W
$T_{STG}, T_J$	Storage and operating temperature range	-55 to 150	$^\circ C$

### Thermal Characteristics

Symbol	Parameter	Typical	Max	Unit
$R_{\theta JL}$	Thermal Resistance-Junction to Lead		29	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient		48	$^\circ C/W$

## Electrical Characteristics

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
<b>Static Electrical Characteristics @ T<sub>j</sub> = 25°C (unless otherwise stated)</b>						
V(BR)DSS	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA	-20	--	--	V
IDSS	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V	--	--	-1	μA
	Zero Gate Voltage Drain Current(T <sub>j</sub> =125°C)	V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V	--	--	-100	μA
IGSS	Gate-Body Leakage Current	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V	--	--	±100	nA
VGS(th)	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-0.3		-2.0	V
RDS(on)	Drain-Source On-State Resistance ③	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A	--		15	mΩ
RDS(on)	Drain-Source On-State Resistance ③	V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-10A	--		20	mΩ
RDS(on)	Drain-Source On-State Resistance ③	V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-8A	--		32	mΩ
<b>Dynamic Electrical Characteristics @ T<sub>j</sub> = 25°C (unless otherwise stated)</b>						
Ciss	Input Capacitance	V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V, f=1MHz			4655	pF
Coss	Output Capacitance				465	pF
Crss	Reverse Transfer Capacitance				335	pF
Rg	Gate Resistance	f=1MHz	0.2		5	Ω
Qg	Total Gate Charge	V <sub>DS</sub> =-10V, I <sub>D</sub> =-10A, V <sub>GS</sub> =-4.5V	--		39	nC
Qgs	Gate-Source Charge		--		8.1	nC
Qgd	Gate-Drain Charge		--		7.8	nC
<b>Switching Characteristics</b>						
Td(on)	Turn-on Delay Time	V <sub>DD</sub> =-10V, I <sub>D</sub> =-10A, R <sub>G</sub> =2.7Ω, V <sub>GS</sub> =-10V	--	7.6	--	ns
Tr	Turn-on Rise Time		--	44	--	ns
Td(off)	Turn-Off Delay Time		--	75	--	ns
Tf	Turn-Off Fall Time		--	27	--	ns
<b>Source- Drain Diode Characteristics @ T<sub>j</sub> = 25°C (unless otherwise stated)</b>						
VSD	Forward on voltage	I <sub>SD</sub> =-10A, V <sub>GS</sub> =0V	--	-0.8	-1.2	V
Trr	Reverse Recovery Time	T <sub>j</sub> =25°C, I <sub>SD</sub> =-10A, V <sub>GS</sub> =0V	--	14	28	ns
Qrr	Reverse Recovery Charge	di/dt=-100A/μs	--	4.7	9.4	nC

NOTE:

- ① Repetitive rating; pulse width limited by max junction temperature.
- ② Limited by T<sub>Jmax</sub>, starting T<sub>J</sub> = 25°C, L = 0.5mH, R<sub>G</sub> = 25Ω, I<sub>AS</sub> = -13A, V<sub>GS</sub> = -10V. Part not recommended for use above this value
- ③ Pulse width ≤ 380μs; duty cycle ≤ 2%.

Typical Characteristics

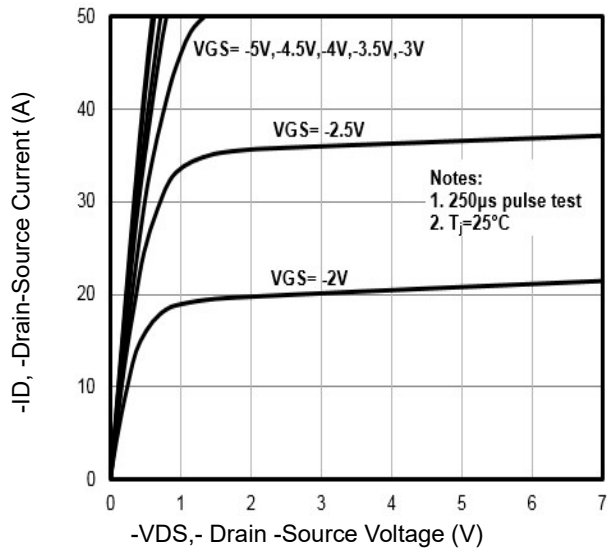


Fig1. Typical Output Characteristics

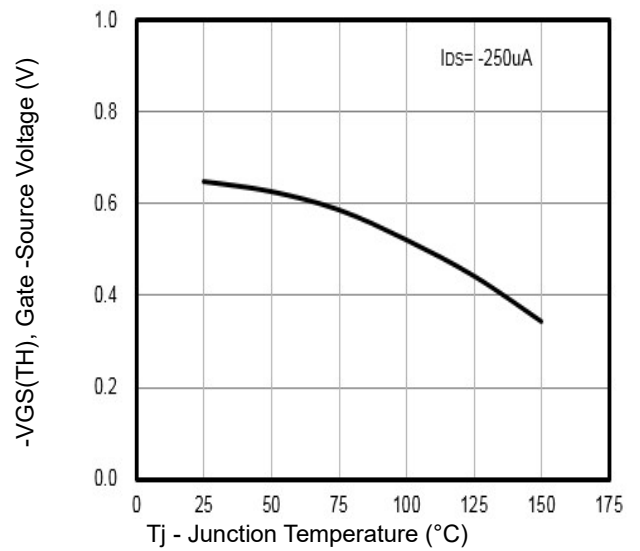


Fig2.  $-V_{GS(TH)}$  Gate -Source Voltage Vs.  $T_j$

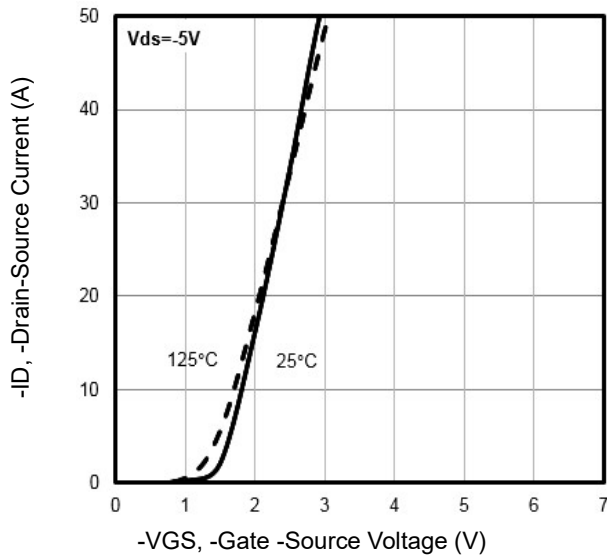


Fig3. Typical Transfer Characteristics

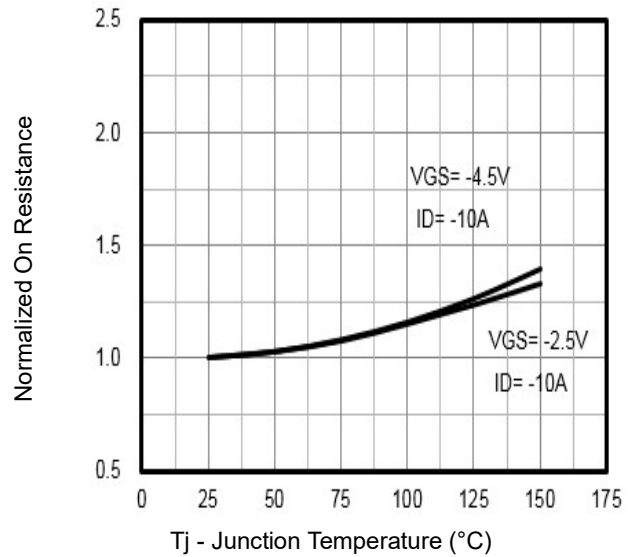


Fig4. Normalized On-Resistance Vs.  $T_j$

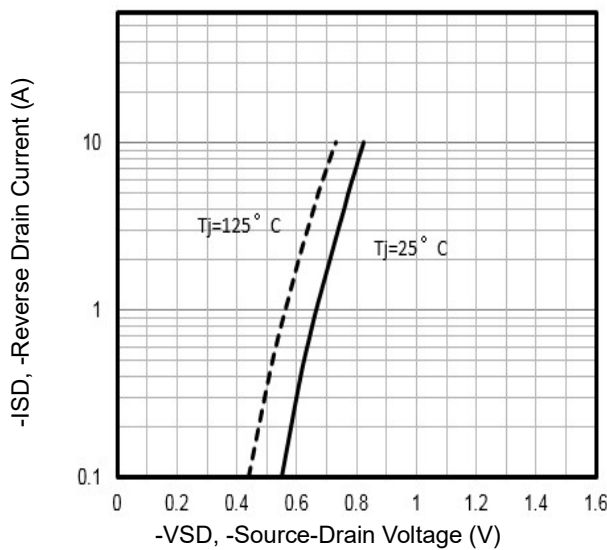


Fig5. Typical Source-Drain Diode Forward Voltage

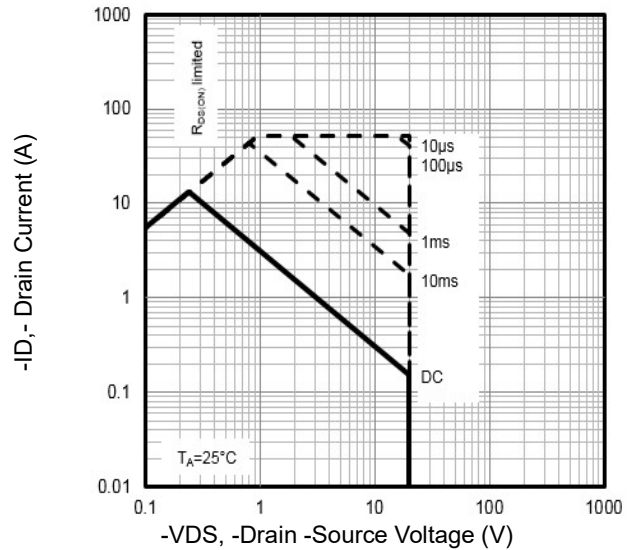


Fig6. Maximum Safe Operating Area

Typical Characteristics

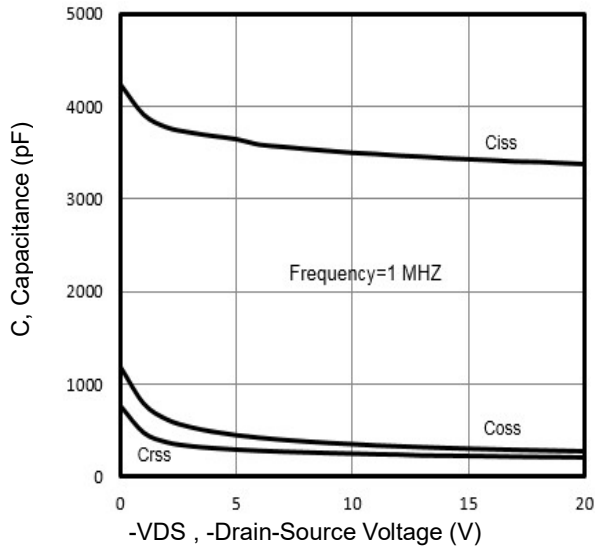


Fig7. Typical Capacitance Vs.Drain-Source Voltage

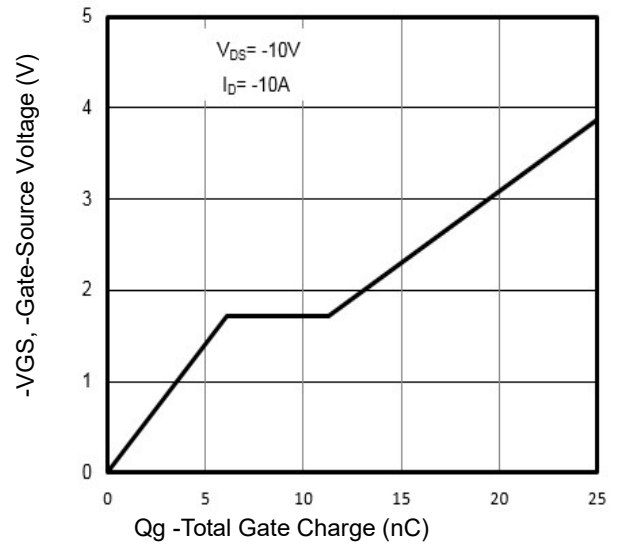


Fig8. Typical Gate Charge Vs.Gate-Source Voltage

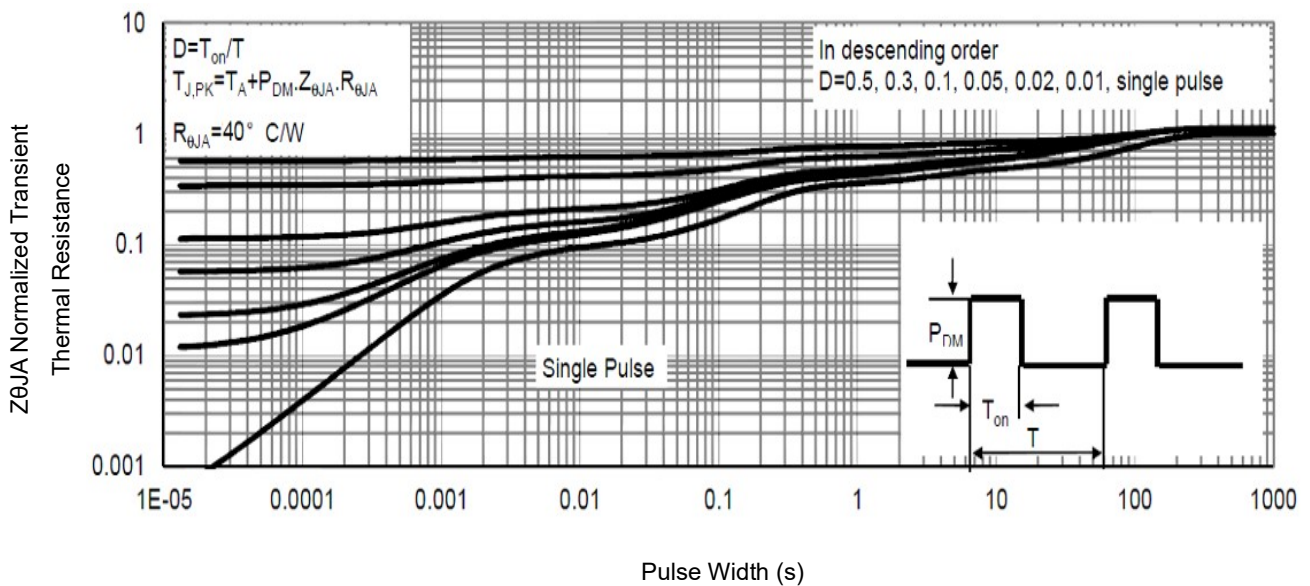


Fig9. Normalized Maximum Transient Thermal Impedance

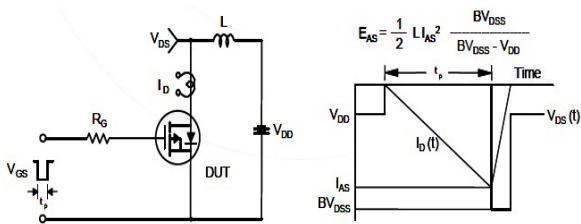


Fig10. Unclamped Inductive Test Circuit and Waveforms

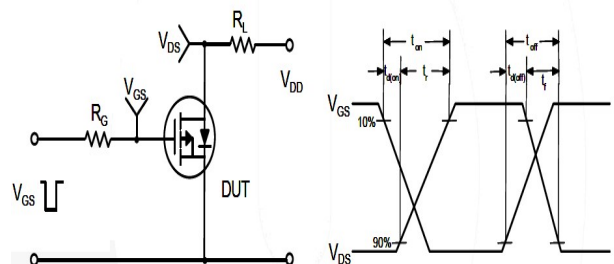


Fig11. Switching Time Test Circuit and waveforms