20V N+P Dual Channel MOSFETs

General Description

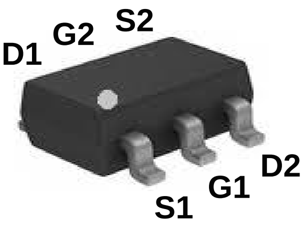
These N+P dual Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.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

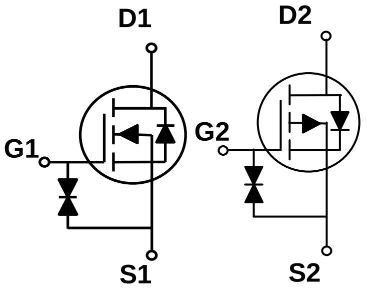
BVDSS	RDSON	ID
20V	300mΩ	800mA
-20V	600mΩ	-400mA

Features

- *Fast switching*
- *Green Device Available*
- *Suit for 1.5V Gate Drive Applications*

SOT 363 Dual Pin Configuration





Applications

- *Notebook*
- *Load Switch*
- *Networking*
- *Hand-held Instruments*

Absolute Maximum Ratings

(Tc=25℃ unless otherwise noted)

Symbol	Parameter	Rating		Units
V_{DS}	Drain-Source Voltage	20	-20	V
V_{GS}	Gate-Source Voltage	±8	±8	V
I_D	Drain Current – Continuous (T_C=25℃)	800	-400	mA
	Drain Current – Continuous (T_C=100℃)	510	-250	mA
I_{DM}	Drain Current – Pulsed[1]	3.2	-1.6	A
P_D	Power Dissipation (T_C=25℃)	275	275	mW
	Power Dissipation – Derate above 25℃	2.2	2.2	mW/℃
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	-55 to 150	℃

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	450	℃/W

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N－CH Electrical Characteristics **(T_J=25 ℃, unless otherwise)**

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	20	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	-0.01	---	V/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=20V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=16V , V_{GS}=0V , T_J=125℃	---	---	10	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=± 6V , V_{DS}=0V	---	---	± 20	uA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=4.5V , I_D=0.5A	---	200	300	mΩ
		V_{GS}=2.5V , I_D=0.4A	---	235	400	
		V_{GS}=1.8V , I_D=0.2A	---	295	550	
		V_{GS}=1.5V , ID=0.1A	---	365	800	
		V_{GS}=1.2V , ID=0.1A	---	600	1500	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	0.3	0.6	1.0	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	3	---	mV/℃

Dynamic and switching Characteristics

Q_g	Total Gate Charge[2，3]	V_{DS}=10V , V_{GS}=4.5V , I_D=0.5A	---	1	2	nC
Q_{gs}	Gate-Source Charge[2，3]		---	0.26	0.5	
Q_{gd}	Gate-Drain Charge[2，3]		---	0.2	0.4	
$T_{d(on)}$	Turn-On Delay Time[2，3]	V_{DD}=10V , V_{GS}=4.5V , R_G=10Ω I_D=0.5A	---	5	10	ns
T_r	Rise Time[2，3]		---	3.5	7	
$T_{d(off)}$	Turn-Off Delay Time[2，3]		---	14	28	
T_f	Fall Time[2，3]		---	6	12	
C_{iss}	Input Capacitance	V_{DS}=10V , V_{GS}=0V , F=1MHz	---	38.2	75	pF
C_{oss}	Output Capacitance		---	14.4	28	
C_{rss}	Reverse Transfer Capacitance		---	6	12	

Drain－Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	0.8	A
I_{SM}	Pulsed Source Current		---	---	1.6	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=0.2A , T_J=25℃	---	---	1	V

Note :

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.

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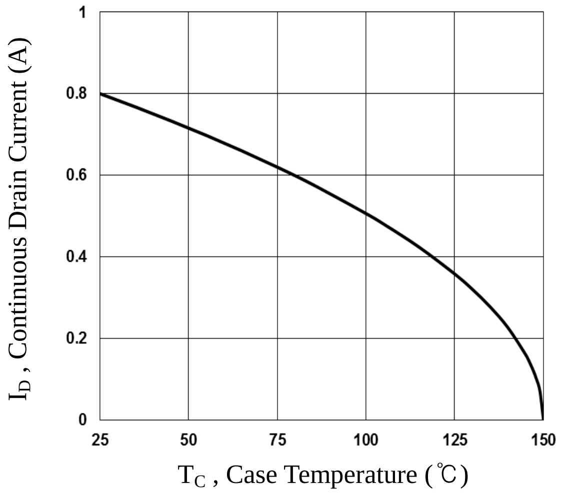

Fig.1 Continuous Drain Current vs. T_C

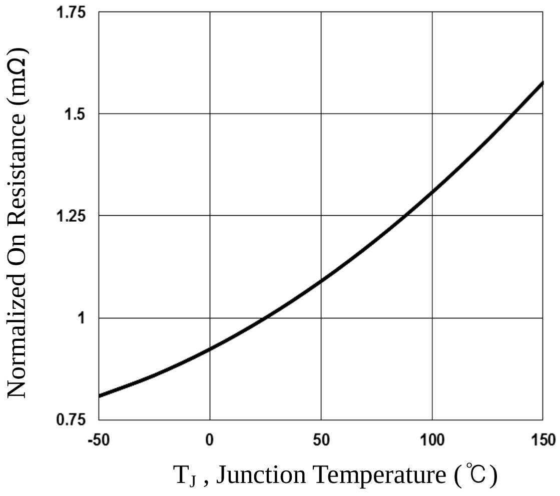

Fig.2 Normalized RDSON vs. T_J

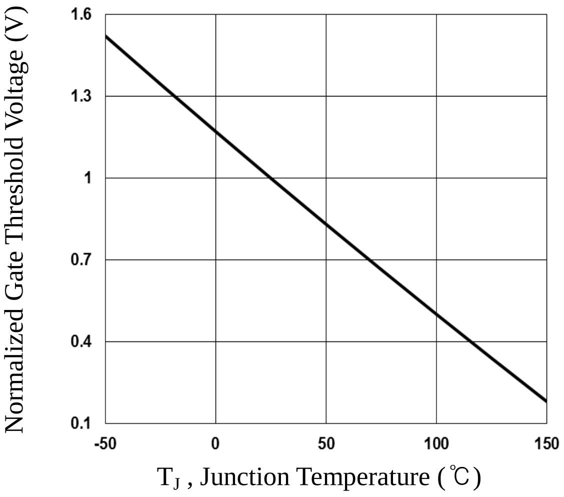

Fig. 3 Normalized V_{th} vs. T_J

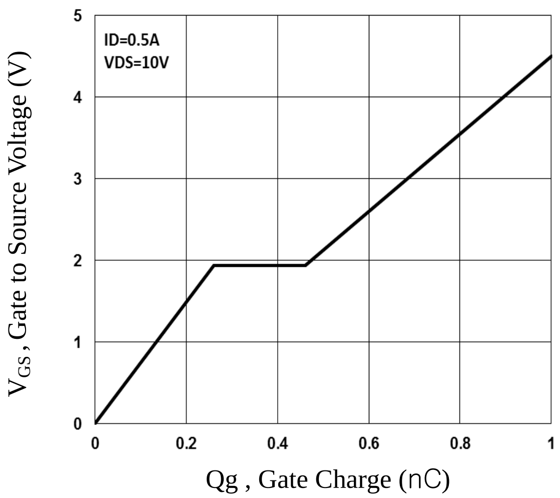

Fig. 4 Gate Charge Waveform

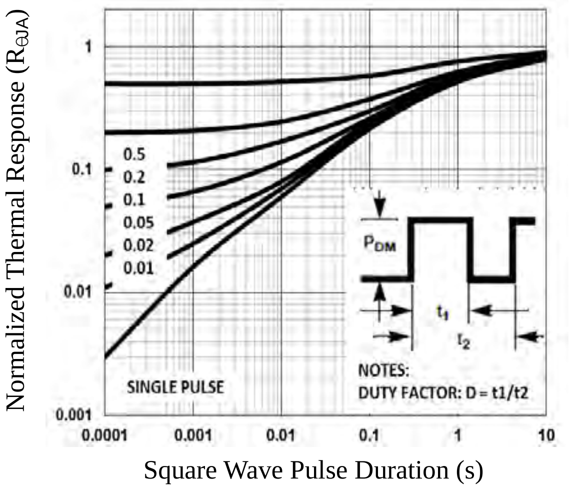

Fig. 5 Normalized Transient Impedance

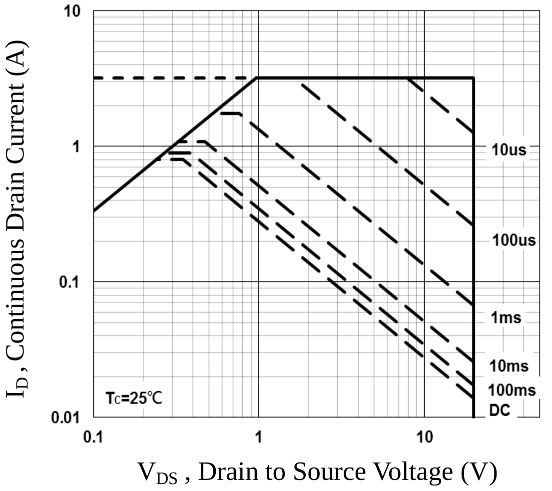

Fig. 6 Maximum Safe Operation Area

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P-CH Electrical Characteristics **(T_J=25 ℃, unless otherwise)**

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-20	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=-1mA	---	-0.01	---	V/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-20V , V_{GS}=0V , T_J=25℃	---	---	-1	uA
		V_{DS}=-16V , V_{GS}=0V , T_J=125℃	---	---	-10	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=± 8V , V_{DS}=0V	---	---	± 20	uA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-4.5V , I_D=-0.3A	---	440	600	mΩ
		V_{GS}=-2.5V , I_D=-0.2A	---	610	850	
		V_{GS}=-1.8V , I_D=-0.1A	---	810	1200	
		V_{GS}=-1.5V , I_D=-0.1A		1020	1600	
		V_{GS}=-1.2V , I_D=-0.1A	---	1800	3000	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-0.3	-0.6	-1.0	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	3	---	mV/℃

Dynamic and switching Characteristics

Q_g	Total Gate Charge[2,3]	V_{DS}=-10V , V_{GS}=-4.5V , I_D=-0.2A	---	1	2	nC
Q_{gs}	Gate-Source Charge[2,3]		---	0.28	0.5	
Q_{gd}	Gate-Drain Charge[2,3]		---	0.18	0.4	
$T_{d(on)}$	Turn-On Delay Time[2,3]	V_{DD}=-10V , V_{GS}=-4.5V , R_G=10Ω I_D=-0.2A	---	8	16	ns
T_r	Rise Time[2,3]		---	5.2	10	
$T_{d(off)}$	Turn-Off Delay Time[2,3]		---	30	60	
T_f	Fall Time[2,3]		---	18	36	
C_{iss}	Input Capacitance	V_{DS}=-10V , V_{GS}=0V , F=1MHz	---	40	78	pF
C_{oss}	Output Capacitance		---	15	30	
C_{rss}	Reverse Transfer Capacitance		---	6.5	13	

Drain -Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	-0.4	A
I_{SM}	Pulsed Source Current		---	---	-0.8	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=-0.2A , T_J=25℃	---	---	-1	V

Note :

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

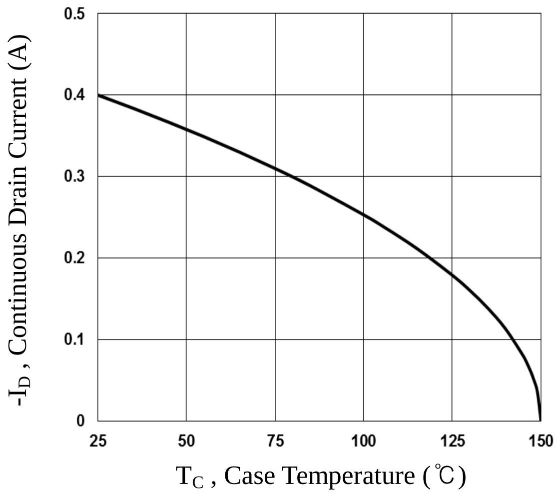

Fig. 7 Continuous Drain Current vs. T_C

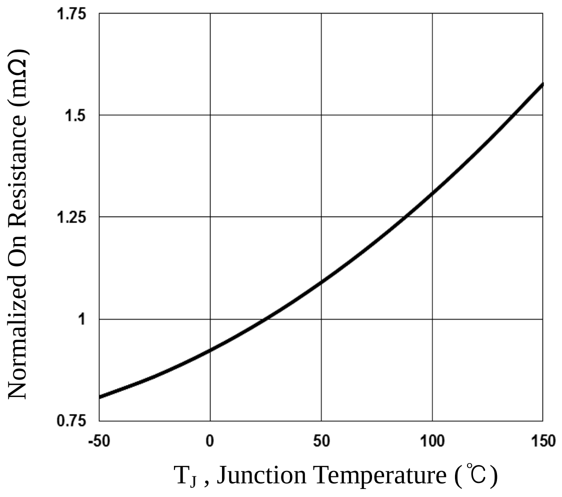

Fig. 8 Normalized RDSON vs. T_J

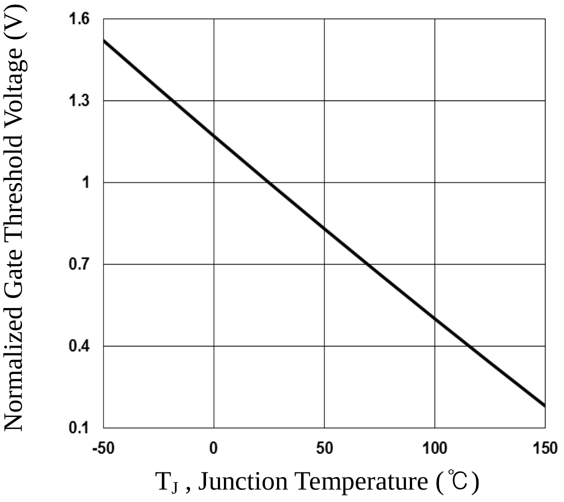

Fig. 9 Normalized V_{th} vs. T_J

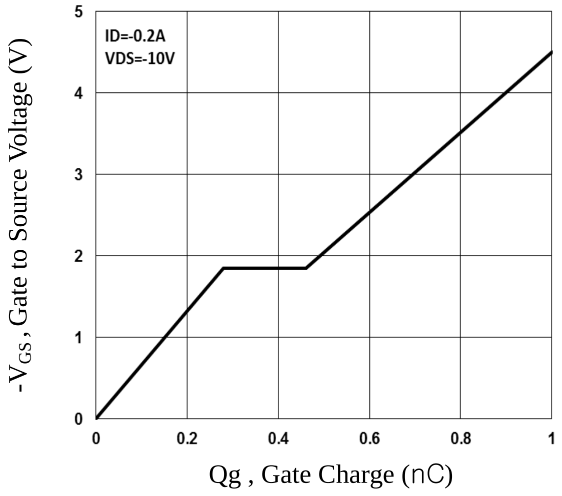

Fig. 10 Gate Charge Waveform

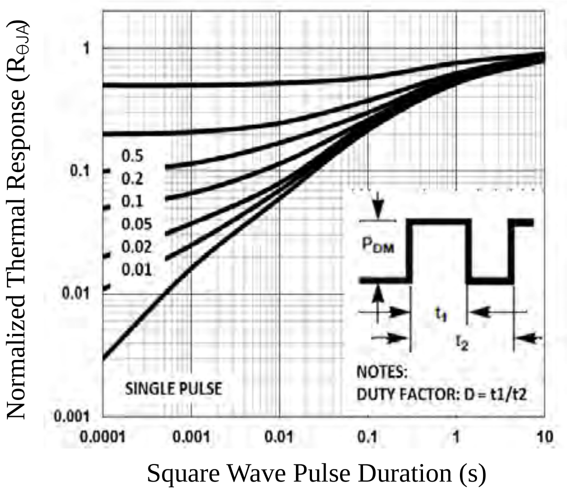

Fig. 11 Normalized Transient Impedance

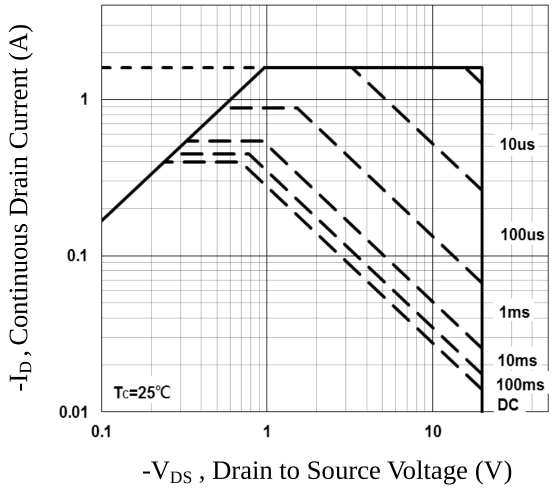

Fig. 12 Maximum Safe Operation Area

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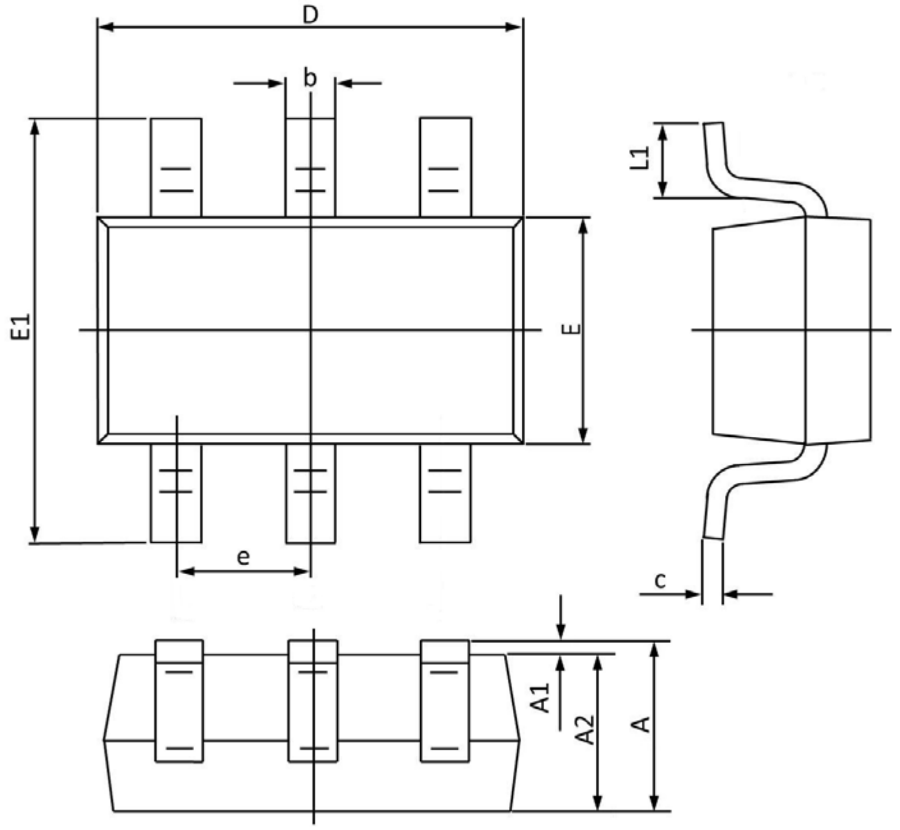
SOT363 Dual PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	1.100	0.800	0.043	0.031
A1	0.100	0.000	0.004	0.000
A2	1.000	0.800	0.039	0.031
b	0.330	0.100	0.013	0.004
c	0.250	0.100	0.010	0.004
D	2.200	1.800	0.087	0.071
E	1.350	1.150	0.053	0.045
E1	2.400	1.800	0.094	0.071
e	0.65BSC		0.026BSC	
L1	0.350	0.100	0.014	0.004