



# ACE3415B

## P-Channel Enhancement Mode Field Effect Transistor

### Description

The ACE3415B uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a load switch or in PWM applications. It is ESD protected.

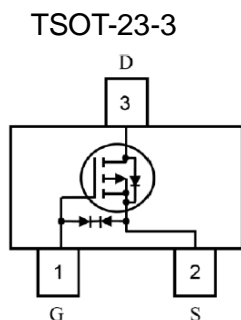
### Features

- $V_{DS}=-20V$ ,  $I_D=-4.3A$
- $R_{DS(ON)}<55m\Omega$  @  $V_{GS}=-4.5V$
- $R_{DS(ON)}<63m\Omega$  @  $V_{GS}=-2.5V$
- $R_{DS(ON)}<73m\Omega$  @  $V_{GS}=-1.8V$
- ESD Protected: 3000V HBM

### Absolute Maximum Ratings

Parameter	Symbol	Max	Unit
Drain-Source Voltage	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	$\pm 8$	V
Drain Current (Continuous)	$I_D$	$T_A=25^\circ C$	-4.3
		$T_A=70^\circ C$	-3.4
Drain Current (Pulse)	$I_{DM}$	-32	A
Power Dissipation	$T_A=25^\circ C$	$P_D$	1
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ C$

### Packaging Type



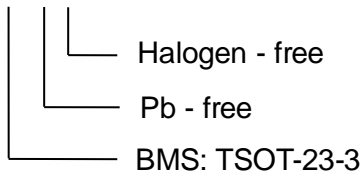
### Pin Configuration

TSOT-23-3	Description
1	Gate
2	Source
3	Drain



### Ordering information

ACE3415B XX + H



### Electrical Characteristics

T<sub>A</sub>=25 °C unless otherwise noted

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
On/Off characteristics						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA	-20			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =-16V, V <sub>GS</sub> =0V			-1	uA
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±8V, V <sub>DS</sub> =0V			±10	nA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4A		42	55	mΩ
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-4A		48	63	
		V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-2A		56	73	
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250uA	-0.3	-0.65	-1	V
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =-5V, I <sub>D</sub> =-4A	8	16		S
Maximum Body-Diode Continuous Current	I <sub>S</sub>				-2.2	A
Drain Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =-1A, V <sub>GS</sub> =0V		-0.81	-1	V
Switching characteristics <sup>(3)</sup>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-10V, I <sub>D</sub> =-4A V <sub>GS</sub> =-4.5V		4.59	5.97	nC
Gate-Source Charge	Q <sub>gs</sub>			2.14	2.78	
Gate-Drain Charge	Q <sub>gd</sub>			2.51	3.26	
Turn-On Delay Time	T <sub>d(on)</sub>	V <sub>DD</sub> =-10V, R <sub>L</sub> =2.5Ω I <sub>D</sub> =-4A, V <sub>GEN</sub> =-4.5V R <sub>G</sub> =3Ω		965.2	1930.4	ns
Turn-On Rise Time	t <sub>f</sub>			1604	3208	
Turn-Off Delay Time	t <sub>d(off)</sub>			7716	15432	
Turn-Off Fall Time	t <sub>f</sub>			3452	6904	
Dynamic characteristics <sup>(3)</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V f=1.0MHz		36.45		pF
Output Capacitance	C <sub>oss</sub>			128.57		
Reverse Transfer Capacitance	C <sub>rss</sub>			15.17		

Note: 1. Pulse width limited by maximum junction temperature

2. Pulse test: PW ≤ 300us, duty cycle ≤ 2%

3. For design AID only, not subject to production testing.

4. Switching time is essentially independent of operating temperature.



Typical Performance Characteristics

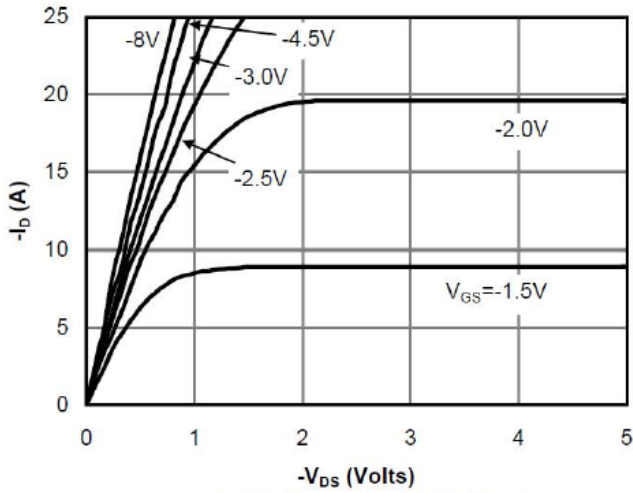


Fig 1: On-Region Characteristics

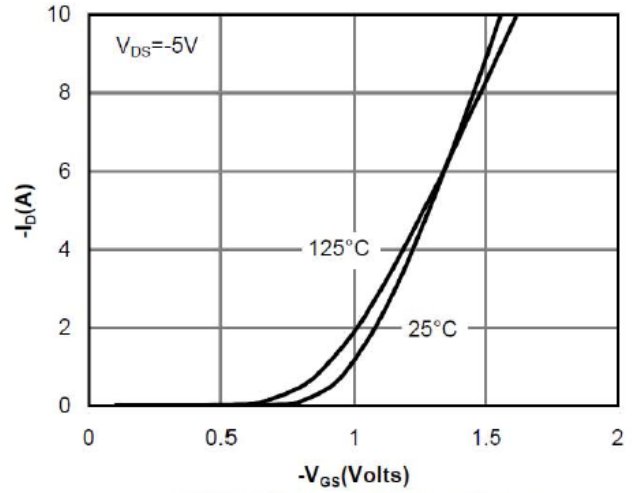


Figure 2: Transfer Characteristics

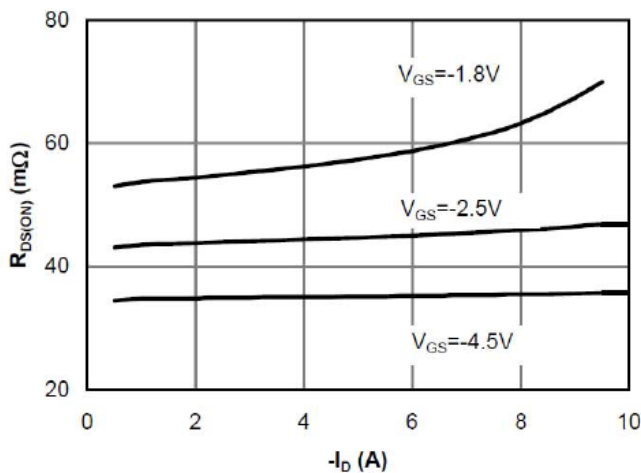


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

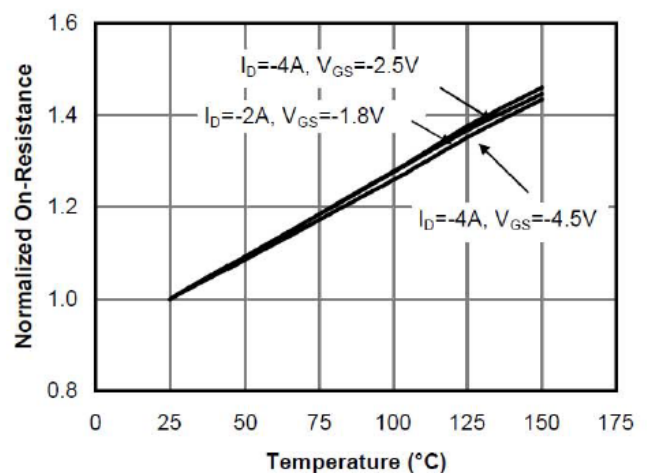


Figure 4: On-Resistance vs. Junction Temperature

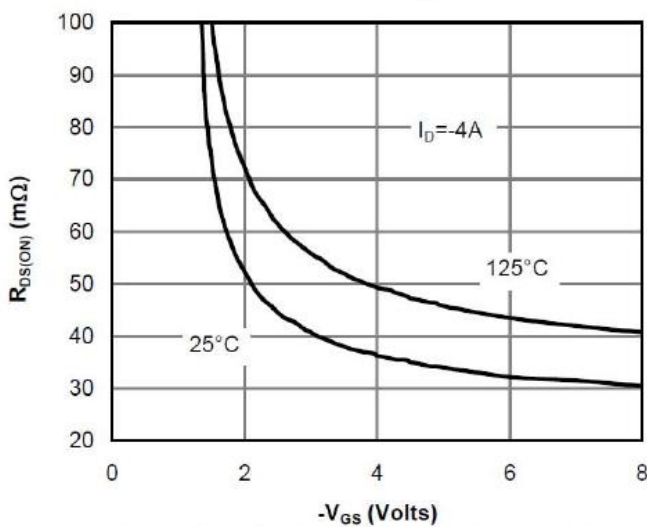


Figure 5: On-Resistance vs. Gate-Source Voltage

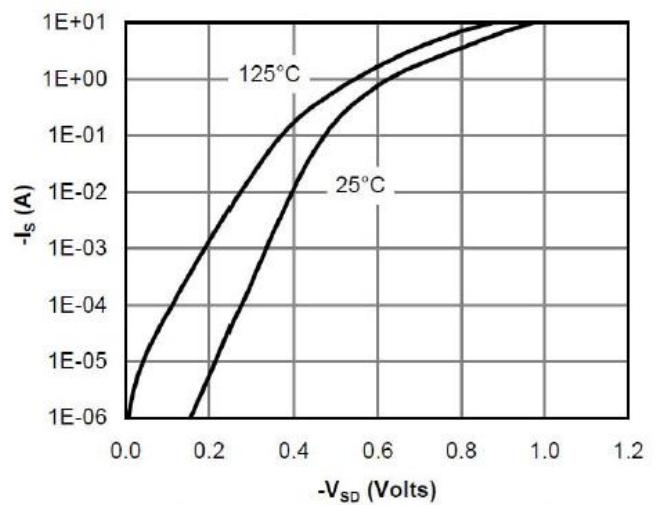


Figure 6: Body-Diode Characteristics



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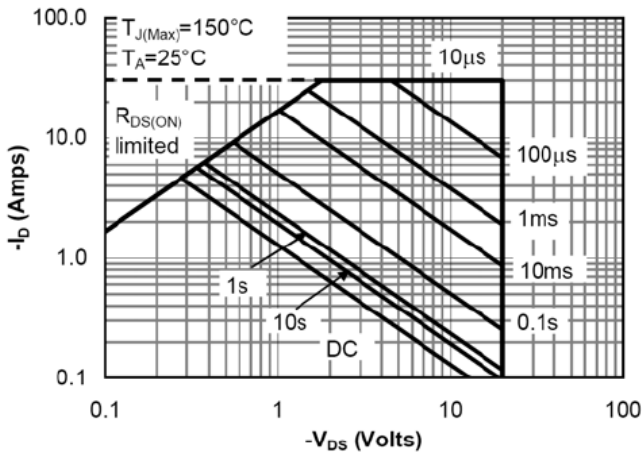


Figure 7: Maximum Forward Biased Safe Operating Area

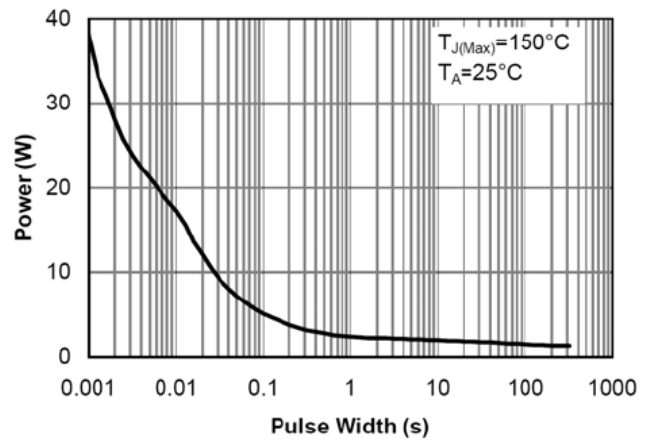


Figure 8: Single Pulse Power Rating Junction-to-Ambient

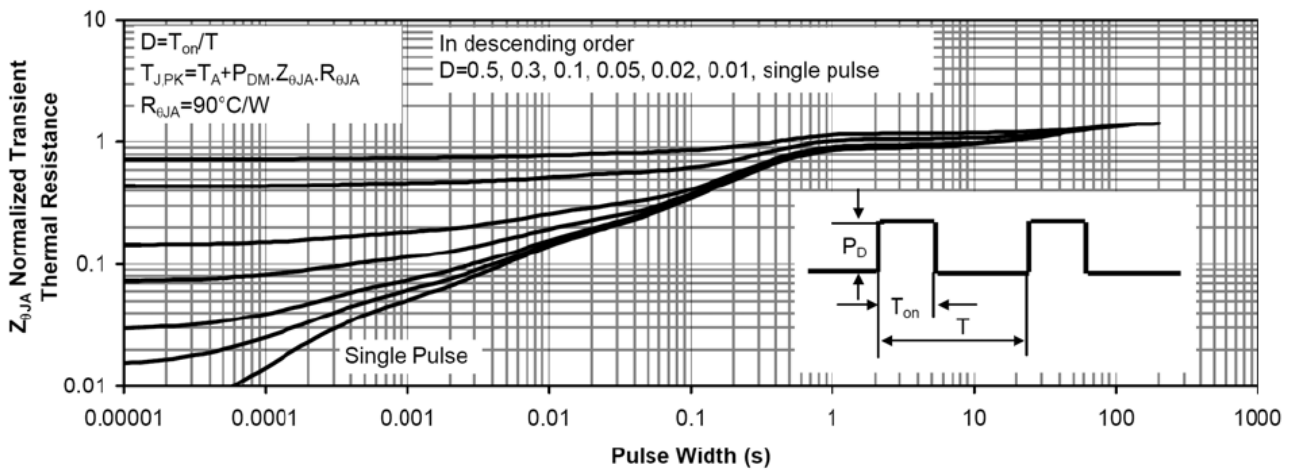
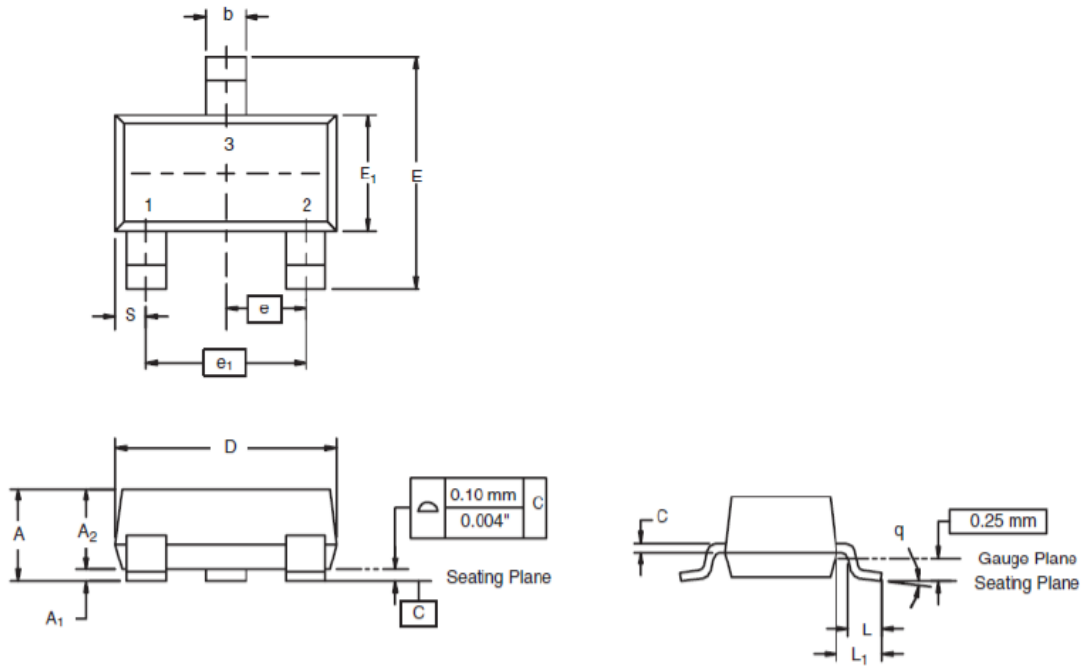


Figure 9: Normalized Maximum Transient Thermal Impedance



Packing Information

TSOT-23-3



Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	0.89	1.12	0.035	0.044
A <sub>1</sub>	0.01	0.10	0.0004	0.004
A <sub>2</sub>	0.88	1.02	0.0346	0.040
b	0.35	0.50	0.014	0.020
c	0.085	0.18	0.003	0.007
D	2.80	3.04	0.110	0.120
E	2.10	2.64	0.083	0.104
E <sub>1</sub>	1.20	1.40	0.047	0.055
e	0.95 BSC		0.0374 Ref	
e <sub>1</sub>	1.90 BSC		0.0748 Ref	
L	0.40	0.60	0.016	0.024
L <sub>1</sub>	0.64 Ref		0.025 Ref	
S	0.50 Ref		0.020 Ref	
q	3°	8°	3°	8°



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### Notes

ACE does not assume any responsibility for use as critical components in life support devices or systems without the express written approval of the president and general counsel of ACE Technology Co., LTD. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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