ACE634

20V Complementary Enhancement Mode Field Effect Transistor

Description

The ACE634 combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.

Features

- N-Channel
  V_{DS}(V)=20V
  I_D=4A
  $R_{DS(ON)}$
  <35mΩ (V_{GS}=4.5V)
  <42mΩ (V_{GS}=2.5V)
- P-Channel
  V_{DS}(V)=-20V
  I_D=-2.5A
  $R_{DS(ON)}$
  <85mΩ (V_{GS}=-4.5V)
  <115mΩ (V_{GS}=-2.5V)

Absolute Maximum Ratings

(T_A=25℃ Unless otherwise noted)

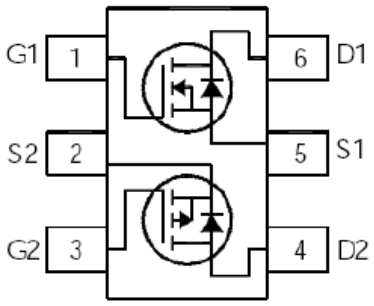
Parameter		Symbol	Typical		Unit
			N-Channel	P-Channel	
Drain-Source Voltage		V_{DSS}	20	-20	V
Gate-Source Voltage		V_{GSS}	±12	±12	V
Continuous Drain Current (T_J=150℃) *AC	T_A=25℃	I_D	4	-2.5	A
	T_A=70℃		3.2	-2	
Drain Current (pulse) * B		I_{DM}	13	-13	A
Power Dissipation	T_A=25℃	P_D	1.1	1.1	W
	T_A=70℃		0.7	0.7	
Operating Junction Temperature		T_J	-55 to 150		°C
Storage Temperature Range		T_{STG}	-55 to 150		°C

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20V Complementary Enhancement Mode Field Effect Transistor

Packaging Type

SOT-23-6



Ordering information

ACE634 XX + H

- H: Halogen - free
- +: Pb - free
- XX: GM : SOT-23-6

Electrical Characteristics (N-Channel)

(T_A=25℃ Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=250uA	20			V
Drain-Source On Resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=3.5A		29	35	mΩ
		V_{GS}=2.5V, I_D=2.5A		35	42	
		V_{GS}=1.8V, I_D=2A		62	75	
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250uA	0.6	0.75	1	V
Gate Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±12V			100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=20V, V_{GS}=0V			1	uA
Forward Transconductance	g_{FS}	V_{DS}=5V, I_D=3A		16		S
Diode Forward Voltage	V_{SD}	I_{SD}=1.7A, V_{GS}=0V		0.74	1.0	V
Maximum Body-Diode Continuous Current	I_S				1.7	A
Switching						
Total Gate Charge	Q_g	V_{DS}=10V, V_{GS}=4.5V, I_D=4A		6.3	8.1	nC
Gate-Source Charge	Q_{gs}			1.7	2.2	
Gate-Drain Charge	Q_{gd}			1.4	1.8	

Turn-On Delay Time	$t_{d(on)}$	V_{GS}=4.5V, V_{DS}=10V, I_D=1A, R_G=6Ω		10.4	20.8	ns
Turn-On Rise Time	t_r			4.4	8.8	
Turn-Off Delay Time	$t_{d(off)}$			27.4	54.8	
Turn- Off Rise Time	t_f			4.2	8.4	
Dynamic						
Input Capacitance	Ciss	V_{GS}=0V, V_{DS}=8V, f=1MHZ		522.3		pF
Output Capacitance	Coss			98.5		
Reverse Transfer capacitance	Crss			74.7		

Note:

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The value in any given application depends on the user's specific board design.

B: Repetitive rating, pulse width limited by junction temperature.

C: The current rating is based on the t≤ 10s junction to ambient thermal resistance rating.

Typical Characteristics (N-Channel)

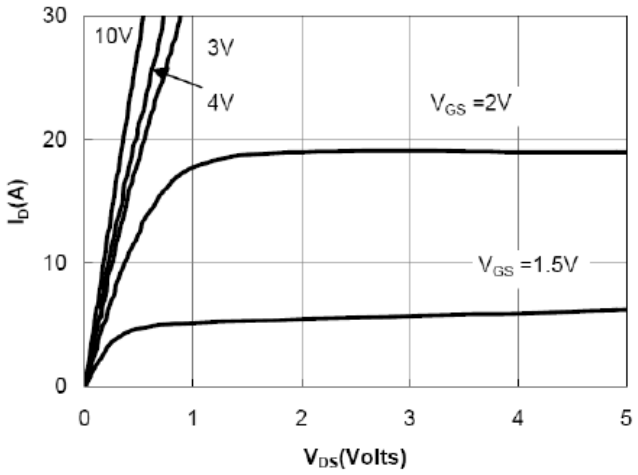


Figure 1: On-Regions Characteristics

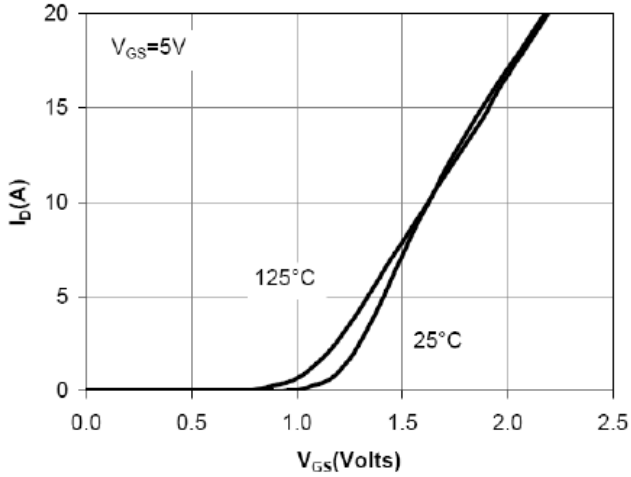


Figure 2: Transfer Characteristics

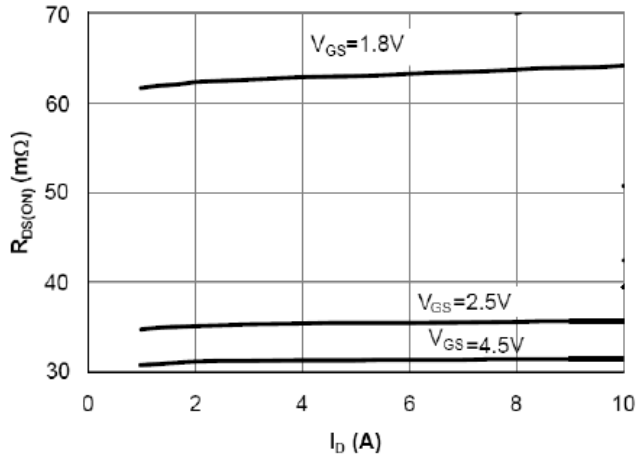


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

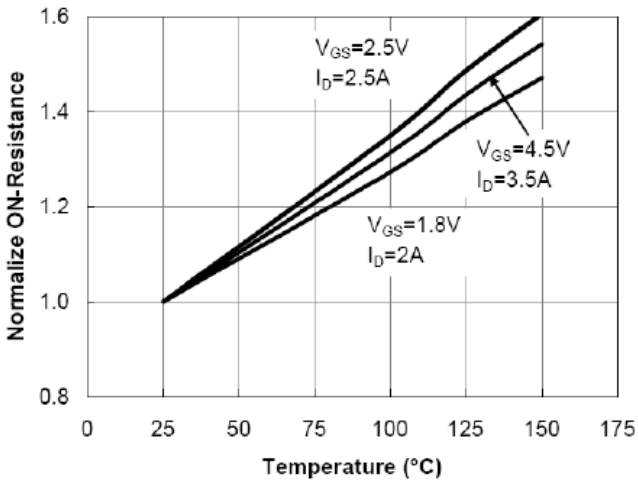


Figure 4: On-Resistance vs. Junction Temperature

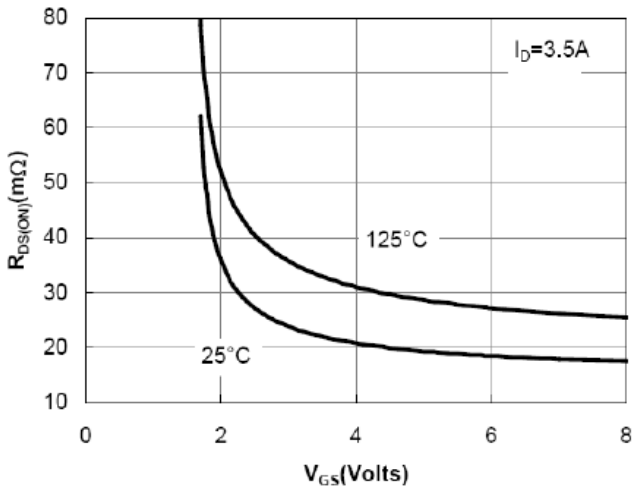


Figure 5: On-Resistance vs. Gate-Source Voltage

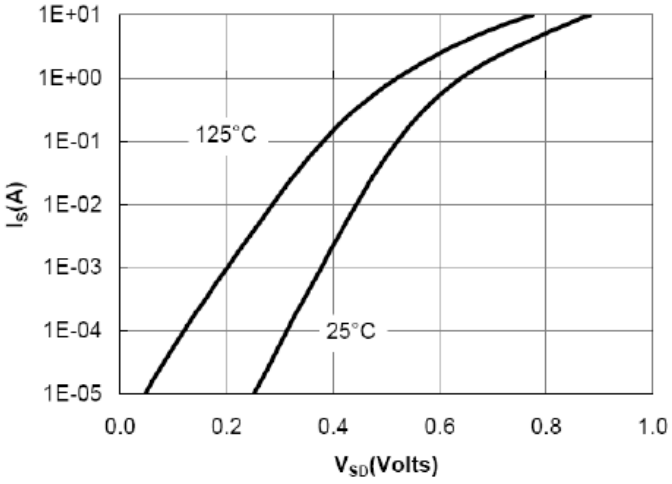


Figure 6: Body-Diode Characteristics

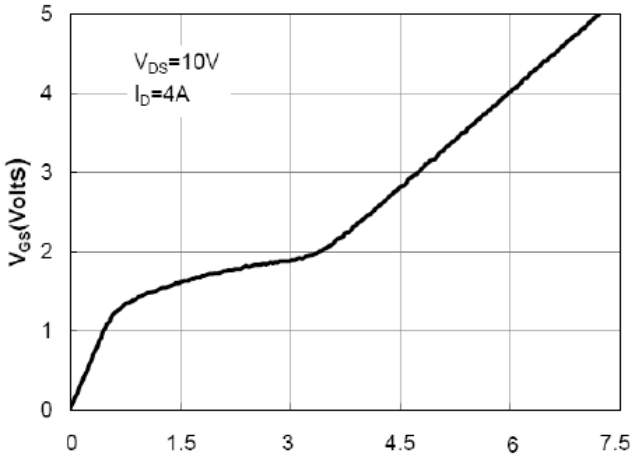


Figure 7: Gate-Charge Characteristics

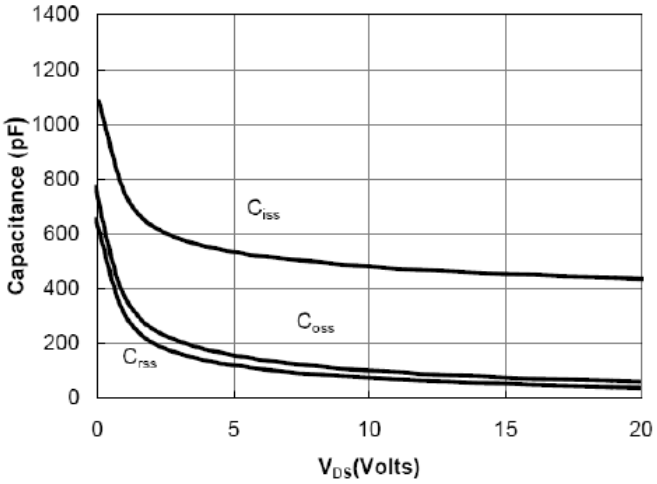


Figure 8: Capacitance Characteristics

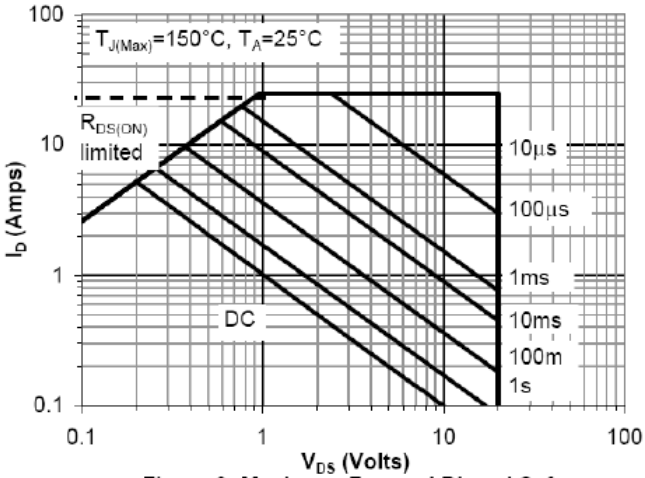


Figure 9: Maximum Forward Biased Safe Operating Area

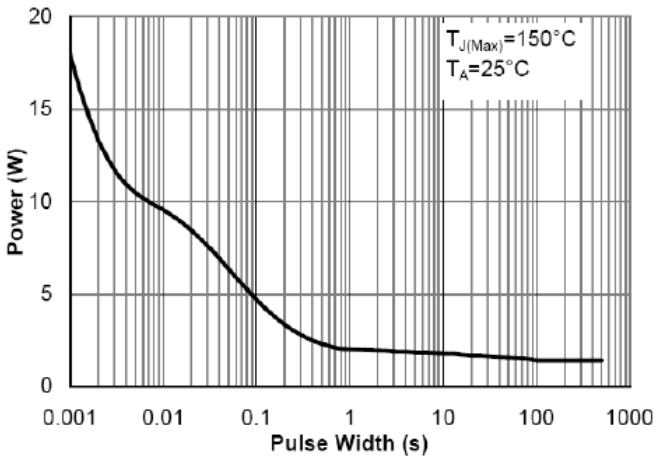


Figure 10: Single Pulse Power Rating Junction-to-Ambient

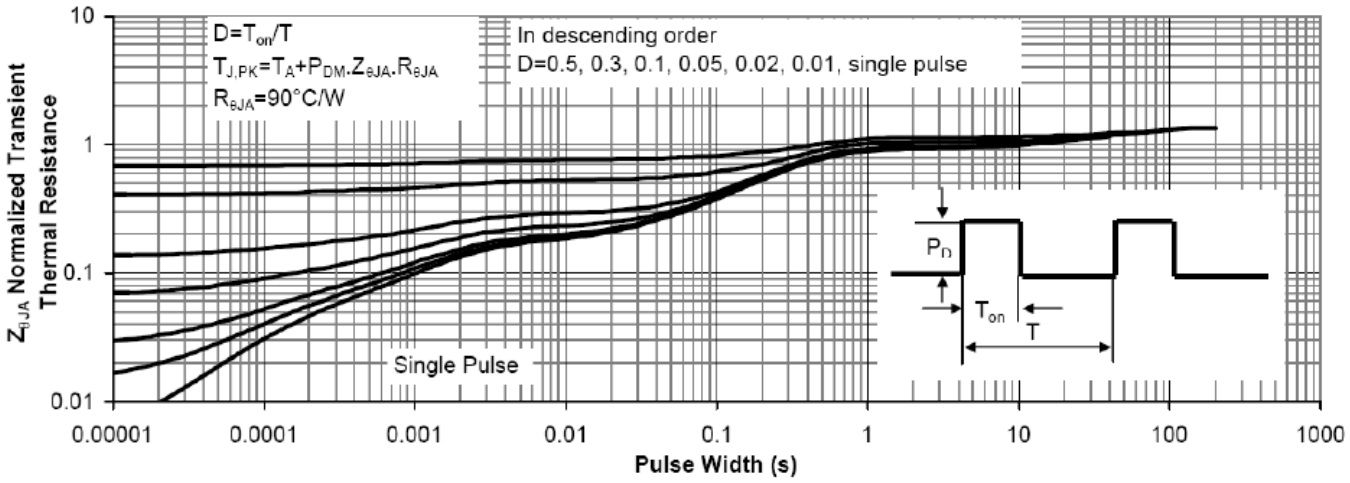


Figure 11: Normalized Maximum Transient Thermal Impedance

Electrical Characteristics (P-Channel)

(T_A=25℃ Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=250uA	-20			V
Drain-Source On Resistance	$R_{DS(ON)}$	V_{GS}=-4.5V, I_D=-2.8A		77	85	mΩ
		V_{GS}=-2.5V, I_D=-2A		92	115	
		V_{GS}=-1.8V, I_D=-2A		118	200	
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250uA	-0.5	-0.6	-1	V
Gate Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±12V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-20V, V_{GS}=0V			-1	uA
Forward Transconductance	g_{FS}	V_{DS}=-5V, I_D =-2.5V		13		S
Diode Forward Voltage	V_{SD}	I_{SD}=-1.6A, V_{GS}=0V		-0.81	-1.0	V
Maximum Body-Diode Continuous Current	I_s				-1.6	A
Switching						
Total Gate Charge	Q_g	V_{DS}=-6V, V_{GS}=-4.5V, I_D=-2.8A		6.6	8.6	nC
Gate-Source Charge	Q_{gs}			0.3	0.4	
Gate-Drain Charge	Q_{gd}			1.3	1.7	
Turn-On Delay Time	$t_{d(on)}$	V_{DD}=-6V, R_G=6Ω, R_L=6Ω, V_{GEN}=-4.5V, I_D=-1A,		9.7	19.4	ns
Turn-On Rise Time	t_r			3.6	7.1	
Turn-Off Delay Time	$t_{d(off)}$			33.3	66.6	
Turn- Off Rise Time	t_f			4.5	9	
Dynamic						
Input Capacitance	Ciss	V_{GS}=0V, V_{DS}=-6V, f=1MHZ		589		pF

Output Capacitance	Coss			91.2		
Reverse Transfer capacitance	Crss			67.2		

Note:

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The value in any given application depends on the user's specific board design.

B: Repetitive rating, pulse width limited by junction temperature.

C: The current rating is based on the t≤ 10s junction to ambient thermal resistance rating.

Typical Characteristics (P-Channel)

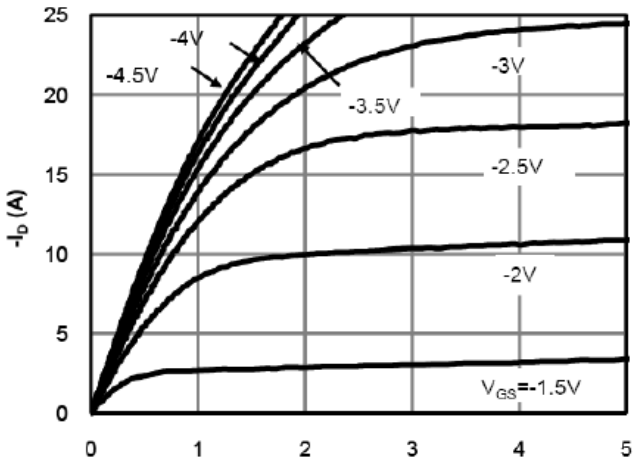


Figure 1: On-Region Characteristics

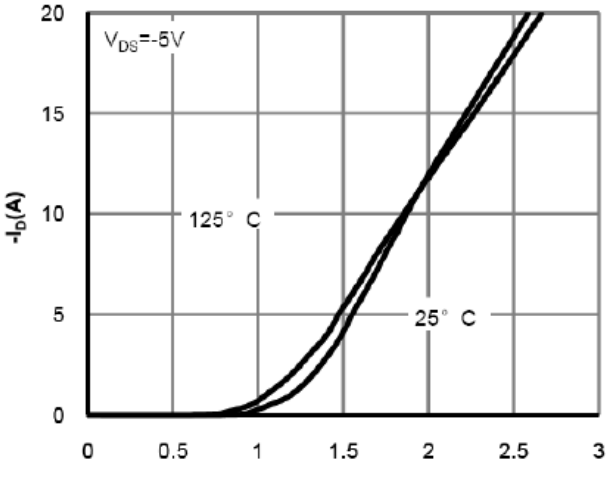


Figure 2: Transfer Characteristics

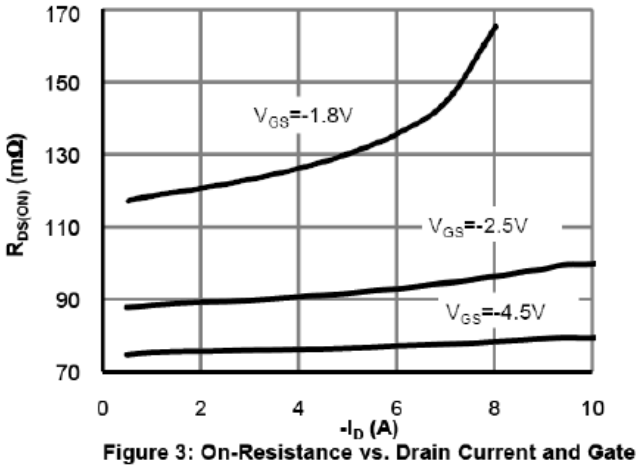


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

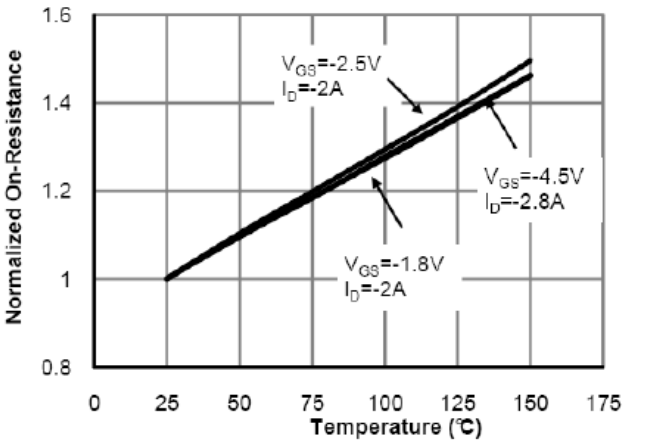


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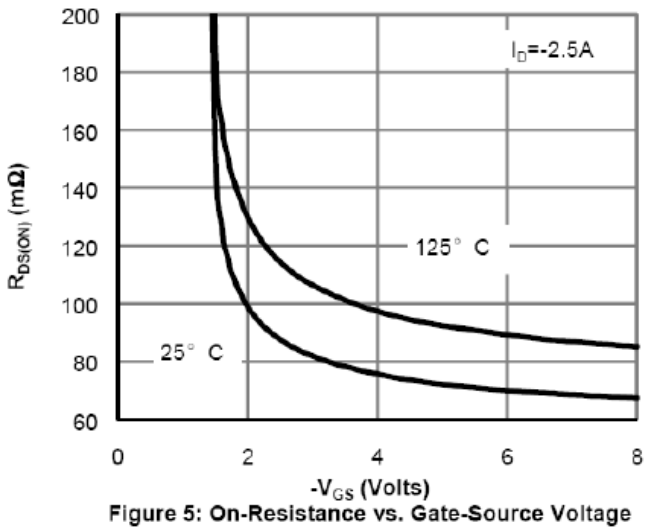


Figure 5: On-Resistance vs. Gate-Source Voltage

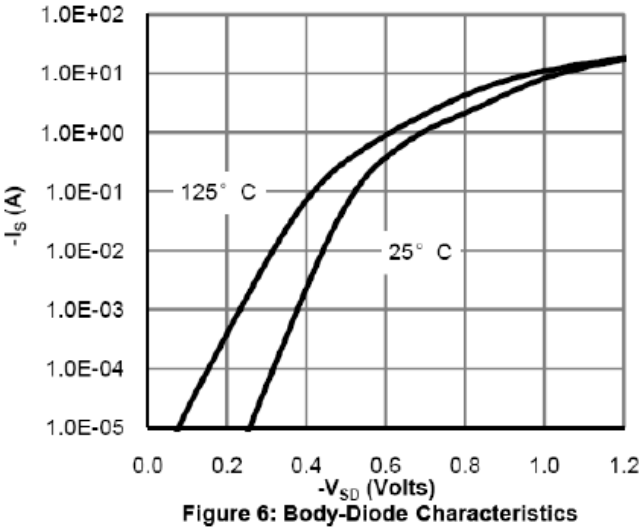


Figure 6: Body-Diode Characteristics

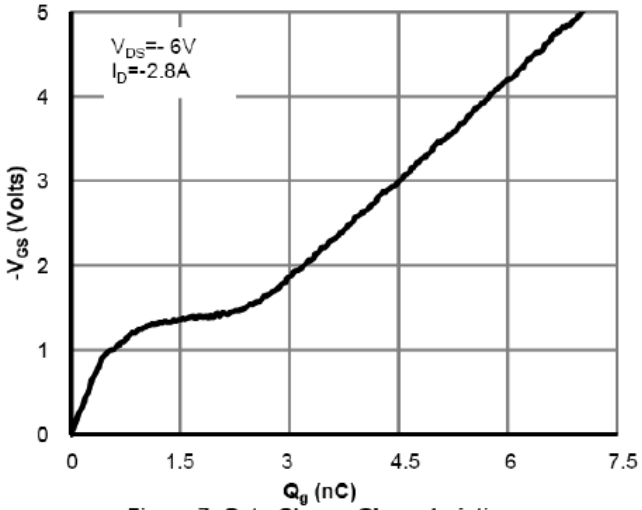


Figure 7: Gate-Charge Characteristics

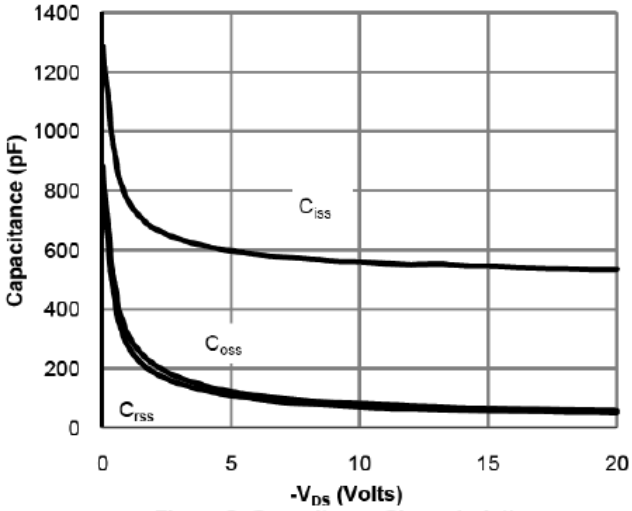


Figure 8: Capacitance Characteristics

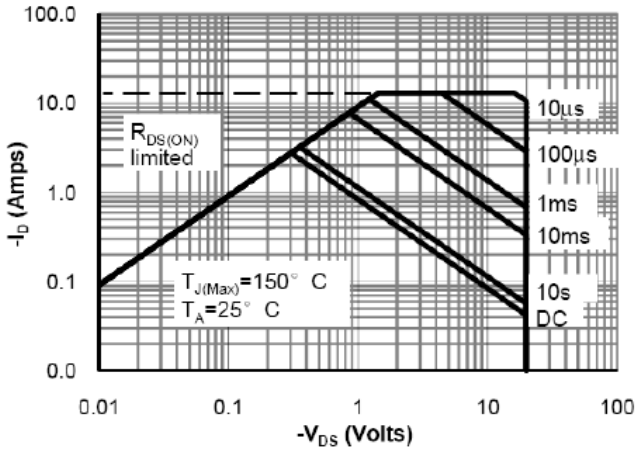


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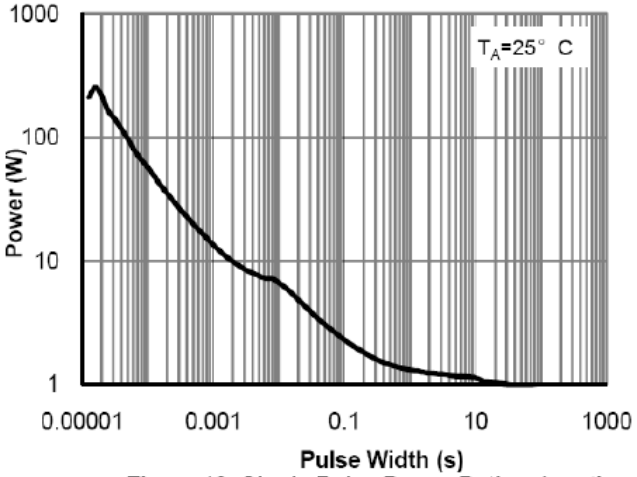


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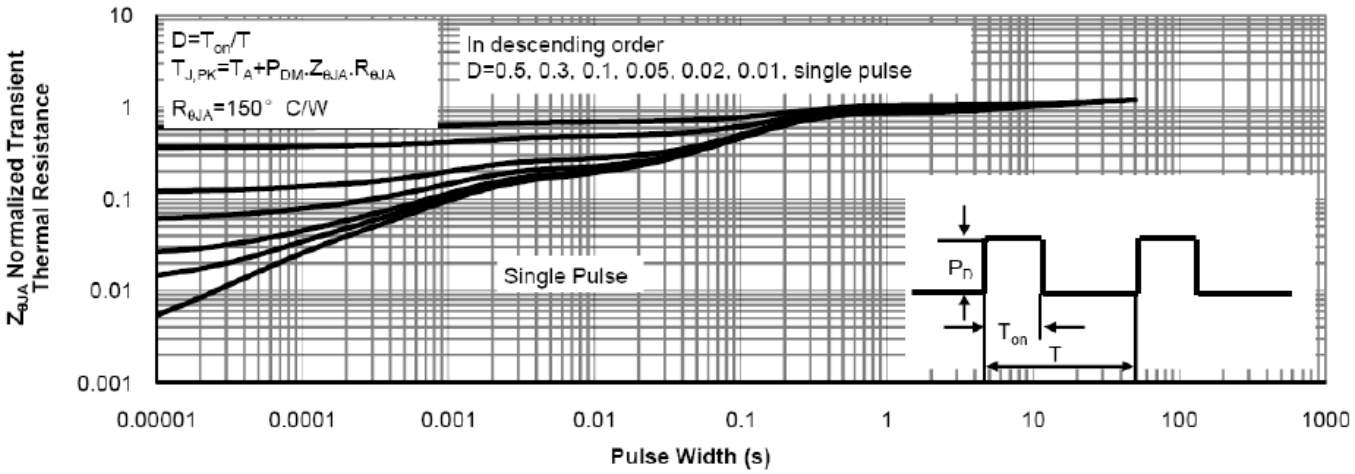
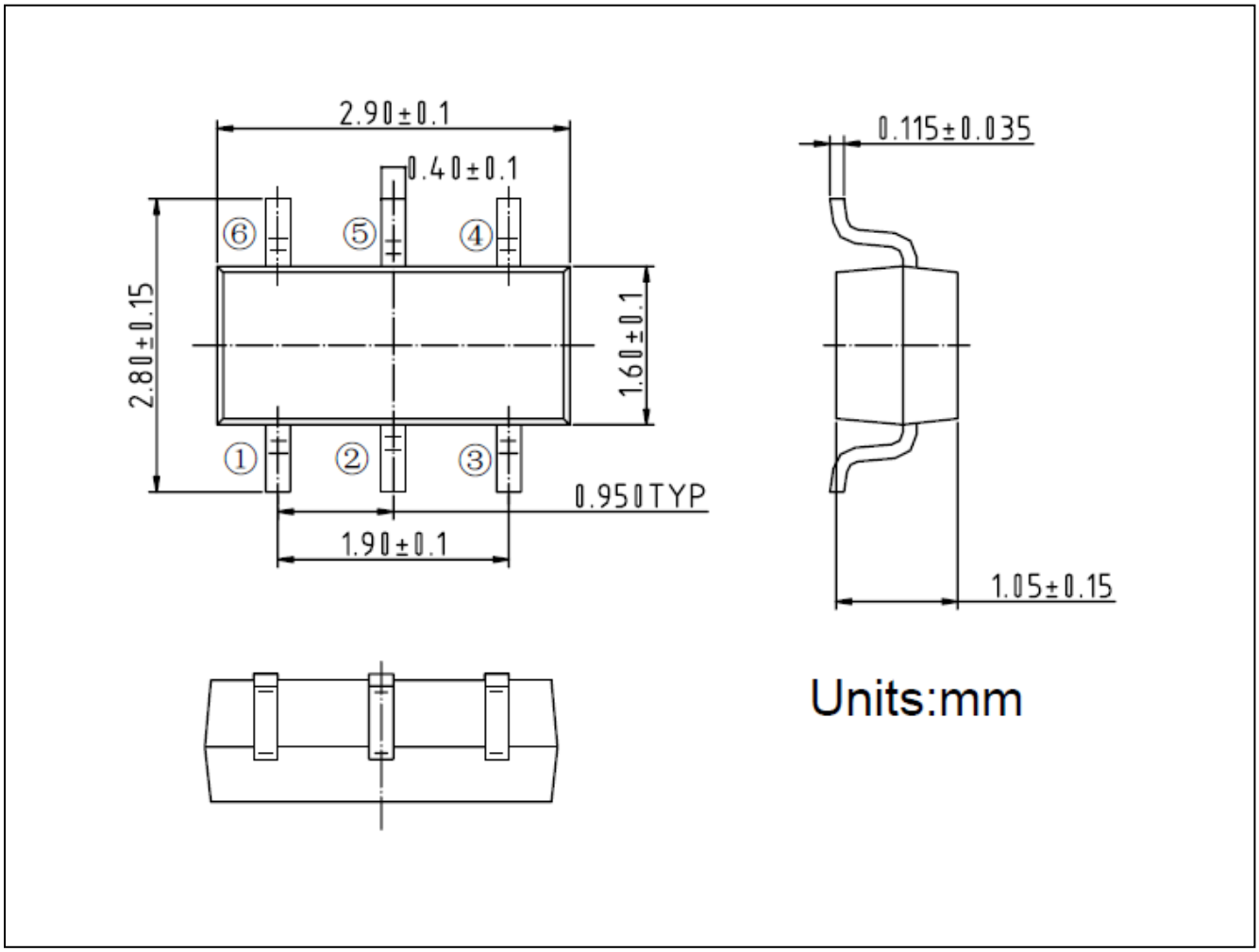


Figure 11: Normalized Maximum Transient Thermal Impedance

Packing Information

SOT-23-6



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 Electronics Co., LTD. As sued 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 shoes 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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