

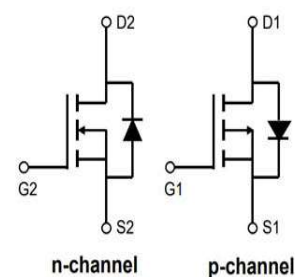
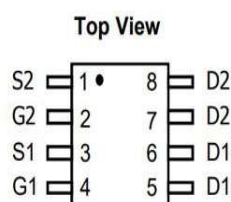
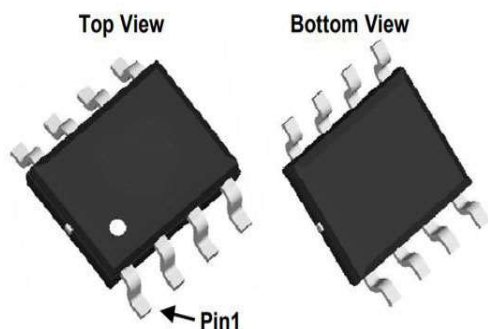
General Description

40V /6A Power MOSFET

Very low on-resistance $R_{DS(on)}$ @ $V_{GS}=4.5V$

Pb-free lead plating; RoHS compliant

V_{DS}	40	-40	V
$R_{DS(on),TYP@V_{GS}=10V}$	26.6	44.1	mΩ
$R_{DS(on),TYP@V_{GS}=4.5}$	41.8	69.3	mΩ
I_D	6	-5	A



Part ID	Package Type	Marking	Tape and reel information
AC6D04C	SOP8	6D04	3000



100% UIS Tested
100% Rg Tested

Parameter		Symbol	Maximum		Units
Drain-Source Voltage		V _{DS}	40	-40	V
Gate-Source Voltage		V _{GS}	20	20	±V
Continuous Drain Current A	T _A =25°C	I _D	6.0	-5.0	A
	T _A =70°C		5.0	-4.0	
Pulsed Drain Current B		I _{DM}	9.6	-8.0	
Avalanche Current G		I _{AR}	1.9	-1.6	
Repetitive avalanche energy L=0.1mH G		E _{AR}	4.4	-3.7	mJ
Power Dissipation A	T _A =25°C	P _D	2.0	2.0	W
	T _A =70°C		1.3	1.3	
Junction and Storage Temperature Range		T _J , T _{STG}	-55 to 150		°C

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient A	R_{JA}	95	142	°C/W
Maximum Junction-to-Ambient A		190	228	°C/W
Maximum Junction-to-Lead C	R_{JL}	57	91	°C/W

N-Channel Electrical Characteristics

STATIC PARAMETERS

Symbol	Parameter	Conditions	Min	Typ	Max	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D = -250\mu A, V_{GS} = 0V$	40			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=40V, V_{GS}=0V$			1	μA
					5	
I_{GSS}	Gate-Body leakage current	$V_{DS} = 0V, V_{GS} = \pm 20V$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.5	2.3	3	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-10V, I_D=6A$		26.6	38.0	m Ω
		$V_{GS}=4.5V, I_D=6A$		41.8	54.3	
g_{FS}	Forward Transconductance	$V_{DS}=5V, I_D=6A$		87		S
V_{SD}	Diode Forward Voltage	$I_S=1A, V_{GS}=22V$		0.72	1	V
I_S	Maximum Body-Diode Continuous Current				6	A

DYNAMIC PARAMETERS

Symbol	Parameter	Conditions	Min	Typ	Max	Units
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=15V, f=1MHz$		516	629	pF
C_{oss}	Output Capacitance			82	100	pF
C_{rss}	Reverse Transfer Capacitance			43	51	pF
R_g	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1MHz$			0.7	Ω

SWITCHING PARAMETERS

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$Q_g(10V)$	Total Gate Charge	$V_{GS}=10V, V_{DS}=15V, I_D=6A$		4.3		nC
$Q_g(4.5V)$	Total Gate Charge			2.2		
Q_{gs}	Gate Source Charge			1.0		
Q_{gd}	Gate Drain Charge			1.4		
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=10V, V_{DS}=15V, R_L=0.75\Omega, R_{GEN}=3\Omega$		9.0		ns
t_r	Turn-On Rise Time			7.2		
$t_{D(off)}$	Turn-Off DelayTime			25.2		
t_f	Turn-Off Fall Time			8.1		
t_{rr}	Body Diode Reverse Recovery Time	$I_F=-8A, di/dt=500A/\mu s$		18.0		ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=18A, di/dt=500A/\mu s$		10.0		nC

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CHANNEL

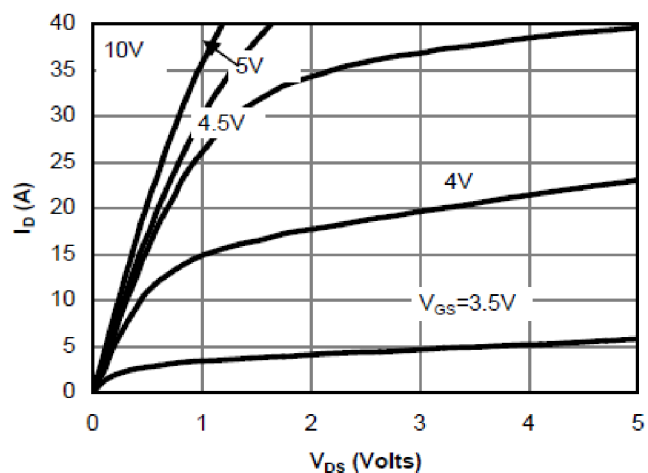


Fig 1: On-Region Characteristics

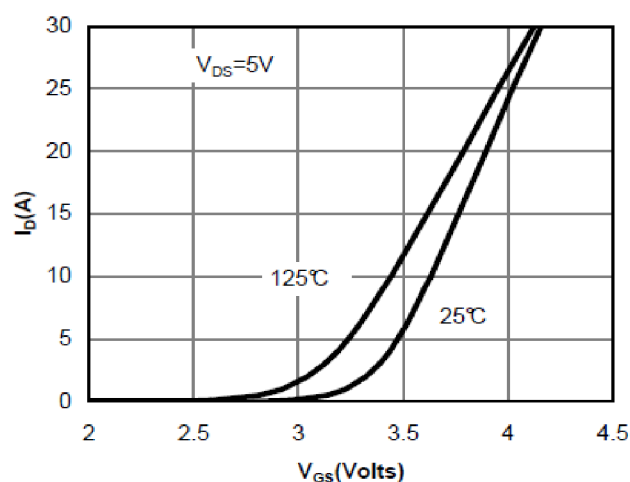


Figure 2: Transfer Characteristics

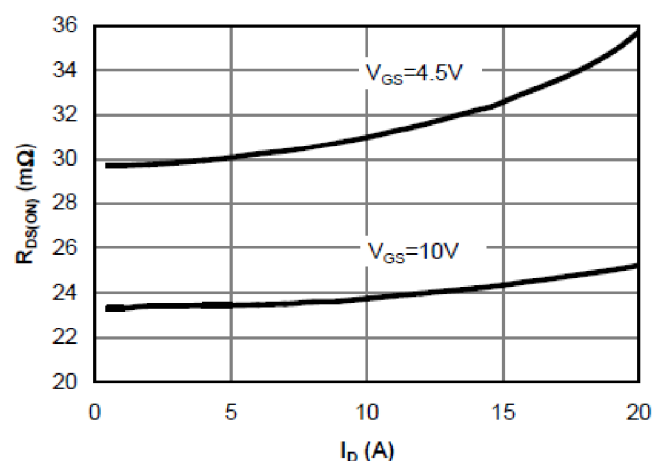


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

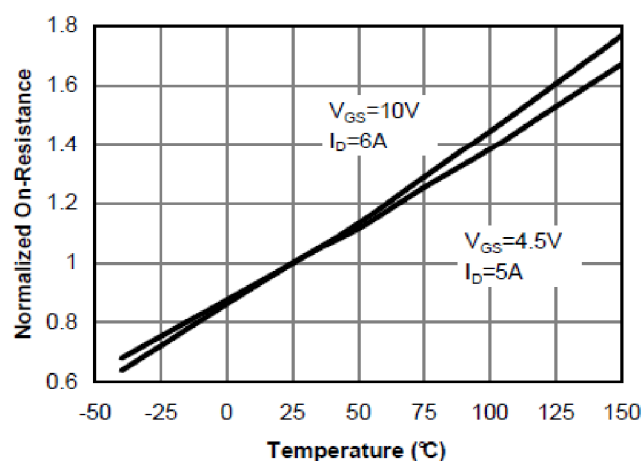


Figure 4: On-Resistance vs. Junction Temperature

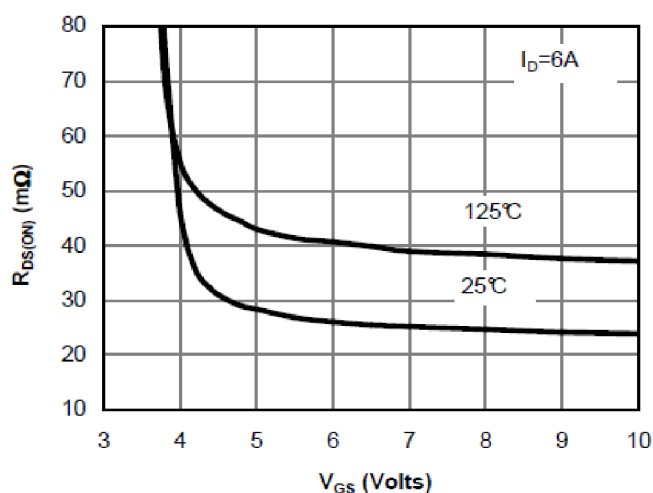


Figure 5: On-Resistance vs. Gate-Source Voltage

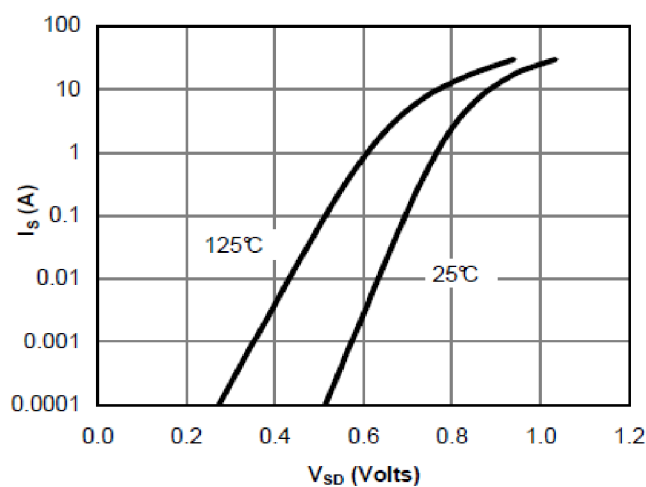


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CHANNEL

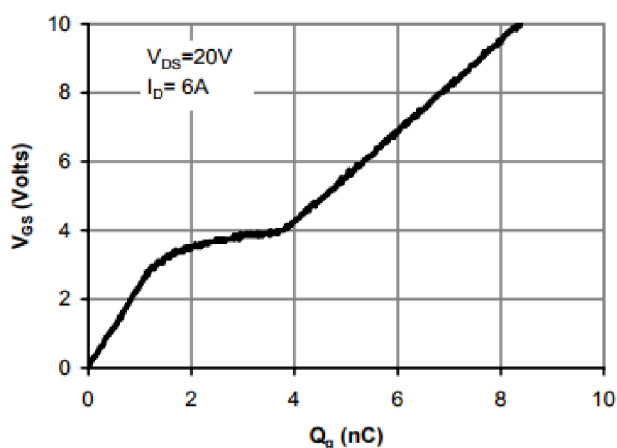


Figure 7: Gate-Charge Characteristics

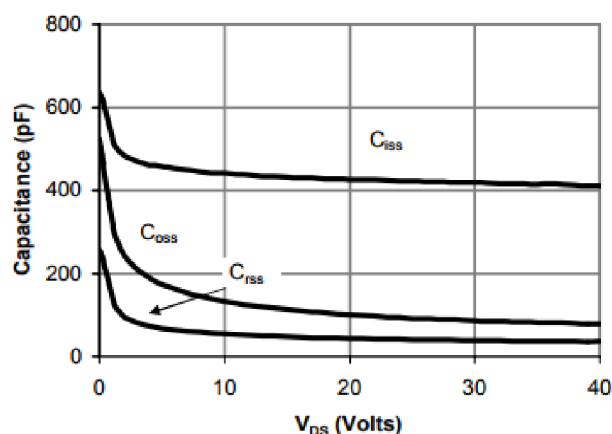


Figure 8: Capacitance Characteristics

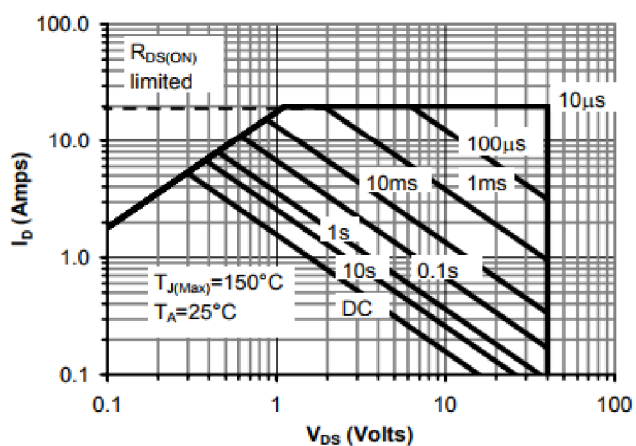


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

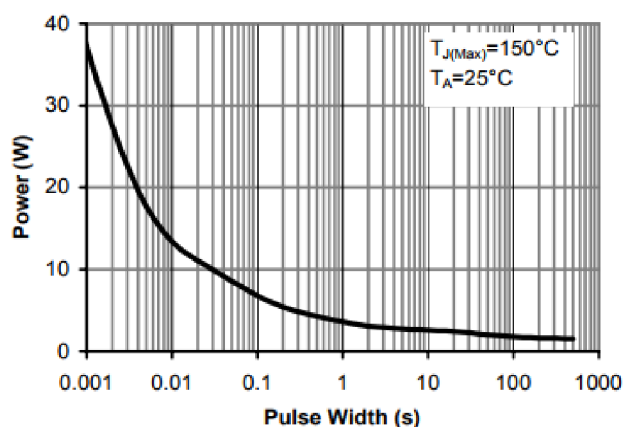


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

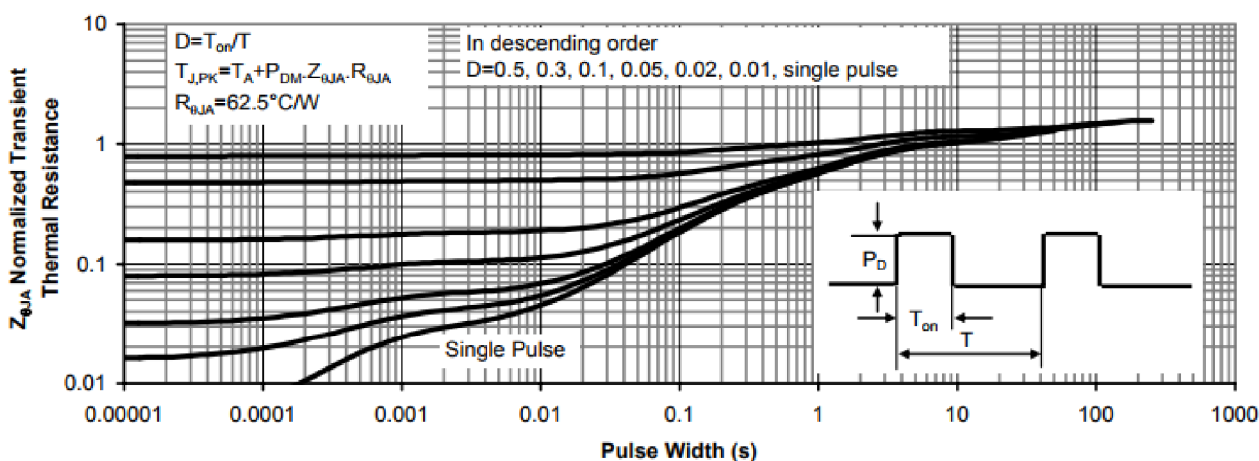


Figure 11: Normalized Maximum Transient Thermal Impedance



P-Channel Electrical Characteristics

STATIC PARAMETERS

Symbol	Parameter	Conditions	Min	Typ	Max	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D = -250\mu A, V_{GS} = 0V$	-40			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -40V, V_{GS} = 0V$			-1 5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS} = 0V, V_{GS} = \pm 20V$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	-1.5	-2.3	-3	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = -10V, I_D = -5A$		44.1	63.0	m Ω
		$V_{GS} = -4.5V, I_D = -5A$		69.3	90.1	
g_{FS}	Forward Transconductance	$V_{DS} = -5V, I_D = -5A$		53		S
V_{SD}	Diode Forward Voltage	$I_S = -1A, V_{GS} = 0V$		-0.72	-1	V
I_S	Maximum Body-Diode Continuous Current				-5	A

DYNAMIC PARAMETERS

Symbol	Parameter	Conditions	Min	Typ	Max	Units
C_{iss}	Input Capacitance	$V_{GS} = 0V, V_{DS} = -15V, f = 1MHz$		940	1146	pF
C_{oss}	Output Capacitance			97	119	pF
C_{rss}	Reverse Transfer Capacitance			72	85	pF
R_g	Gate resistance	$V_{GS} = 0V, V_{DS} = 0V, f = 1MHz$			1.6	Ω

SWITCHING PARAMETERS

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$Q_g(10V)$	Total Gate Charge	$V_{GS} = -10V, V_{DS} = -15V, I_D = -5A$		7.9		nC
$Q_g(4.5V)$	Total Gate Charge			4.0		
Q_{gs}	Gate Source Charge			2.2		
Q_{gd}	Gate Drain Charge			3.2		
$t_{D(on)}$	Turn-On DelayTime	$V_{GS} = -10V, V_{DS} = -15V, R_L = 0.75\Omega, R_{GEN} = 3\Omega$		10.5		ns
t_r	Turn-On Rise Time			8.4		
$t_{D(off)}$	Turn-Off DelayTime			29.4		
t_f	Turn-Off Fall Time			9.5		
t_{rr}	Body Diode Reverse Recovery Time	$I_F = -8A, dI/dt = 500A/\mu s$		21.0		ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F = 18A, dI/dt = 500A/\mu s$		14.0		nC

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: P-CHANNEL

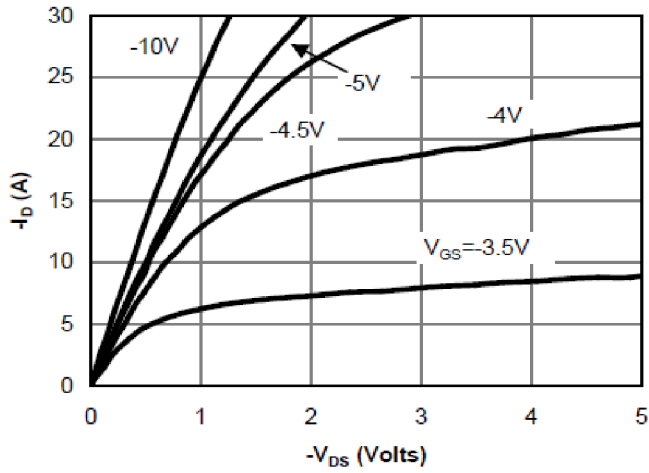


Fig 12: On-Region Characteristics

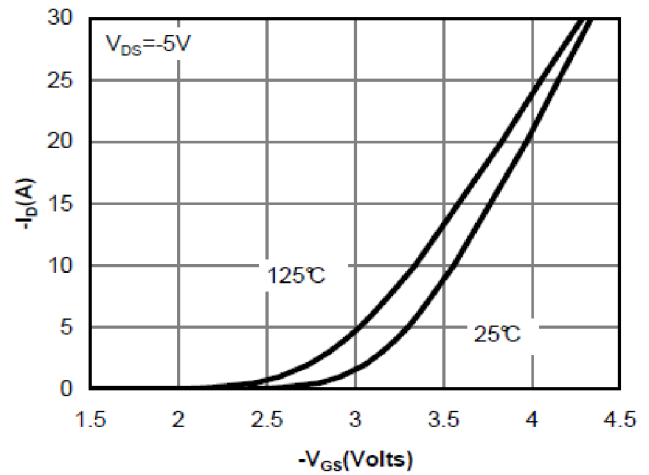


Figure 13: Transfer Characteristics

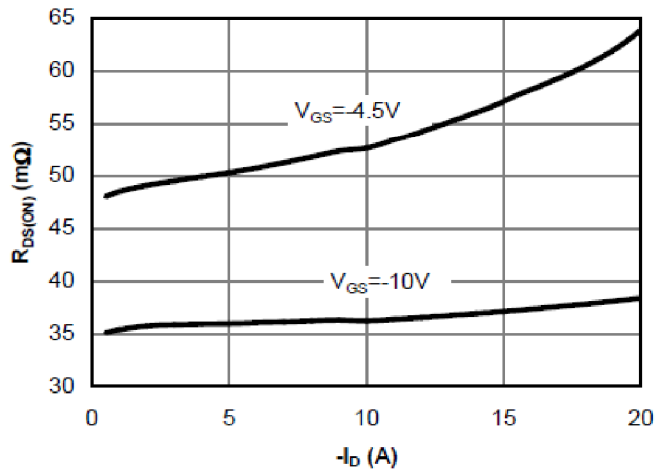


Figure 14: On-Resistance vs. Drain Current and Gate Voltage

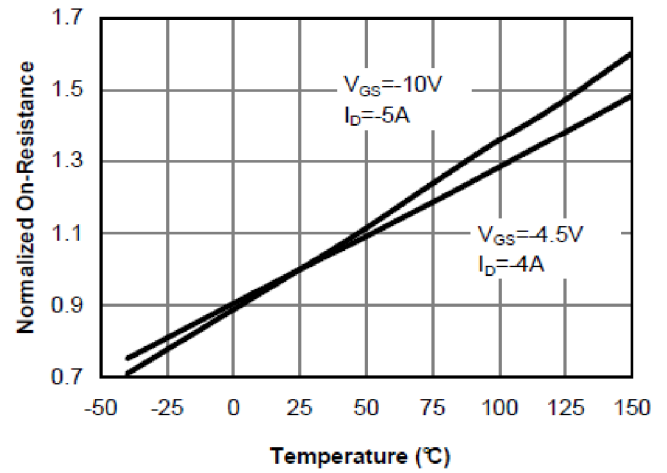


Figure 15: On-Resistance vs. Junction Temperature

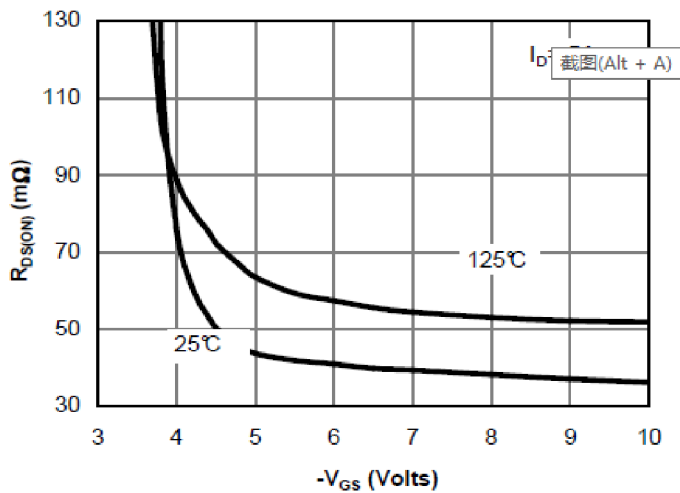


Figure 16: On-Resistance vs. Gate-Source Voltage

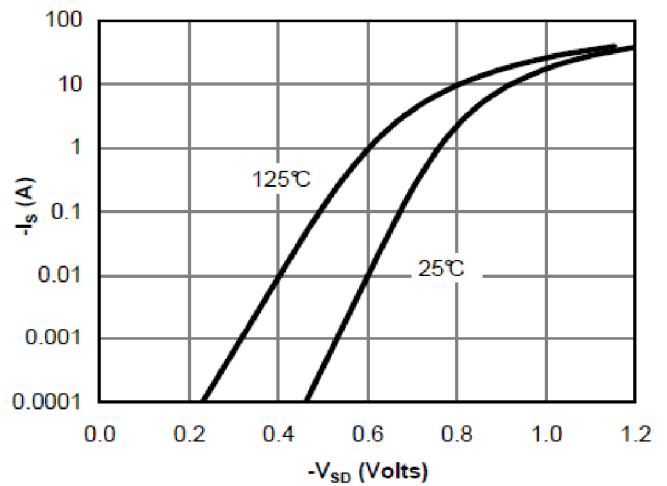


Figure 17: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: P-CHANNEL

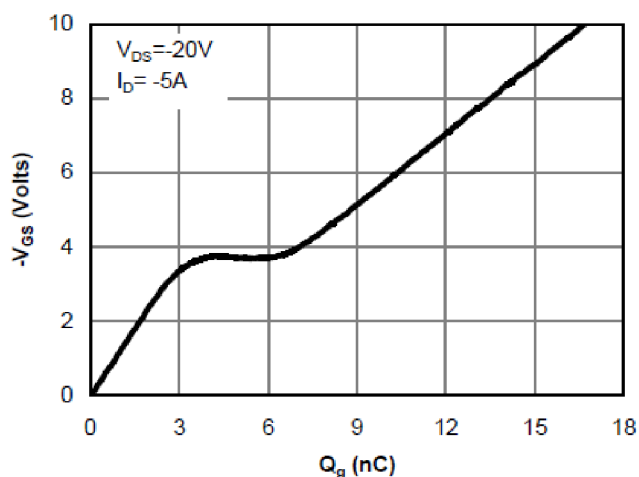


Figure 18: Gate-Charge Characteristics

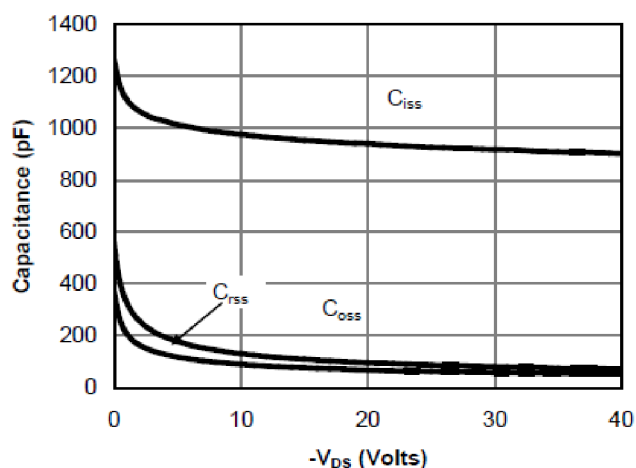


Figure 19: Capacitance Characteristics

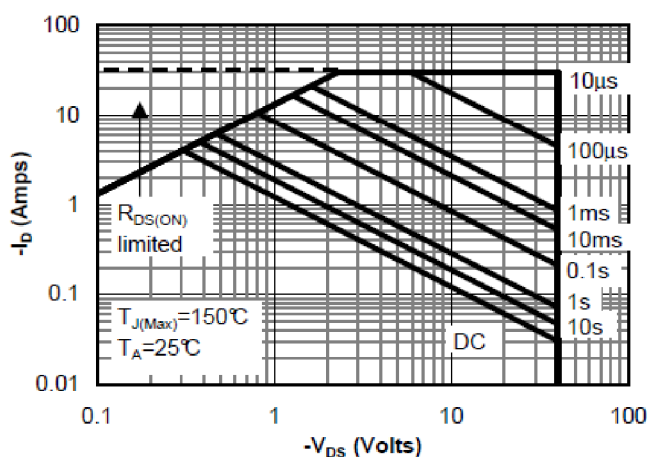


Figure 20: Maximum Forward Biased Safe Operating Area (Note E)

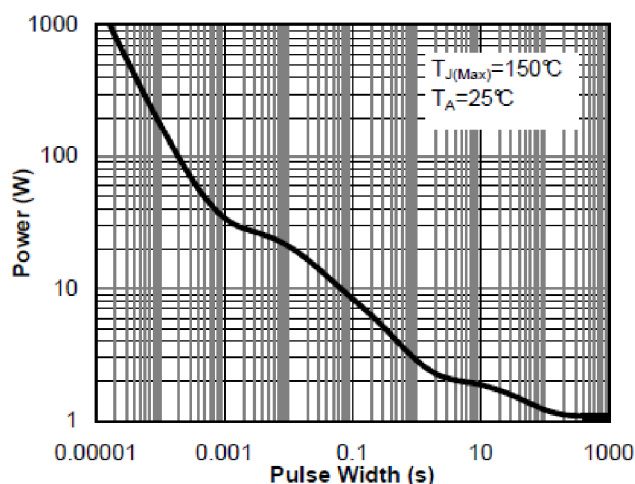


Figure 21: Single Pulse Power Rating Junction-to-Ambient (Note E)

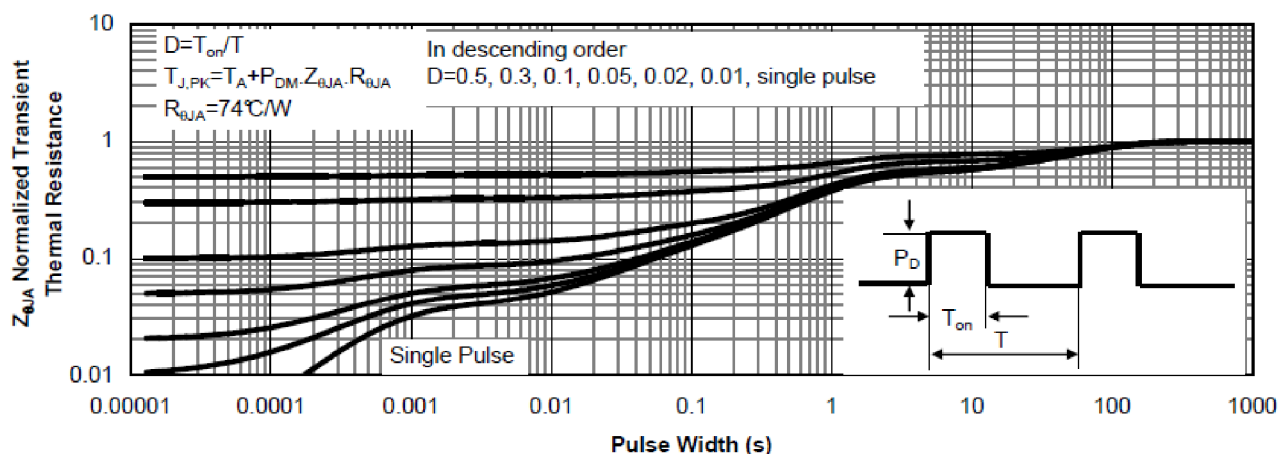
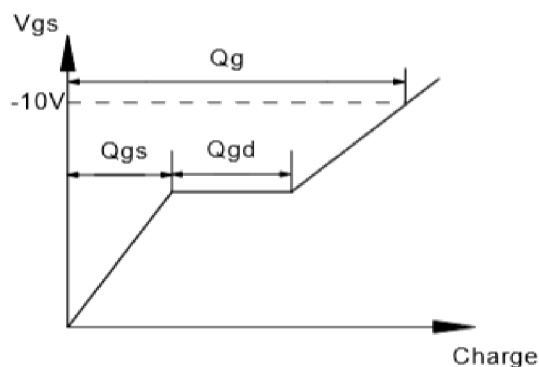
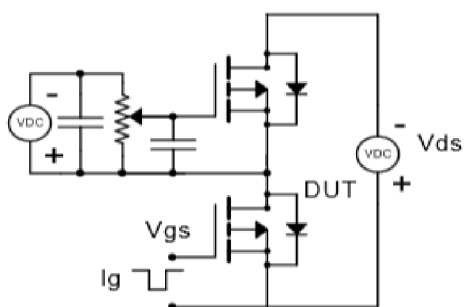
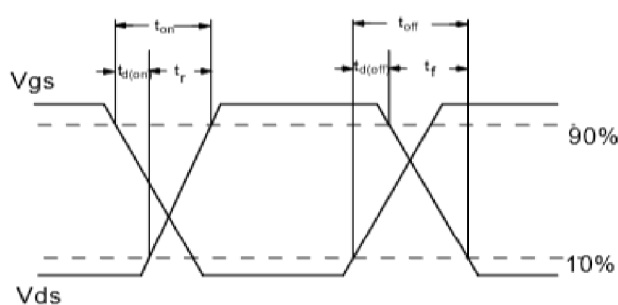
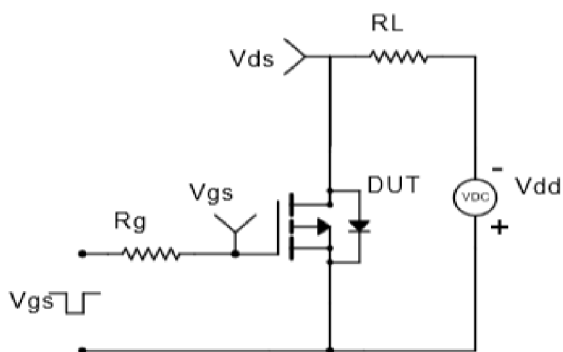


Figure 22: Normalized Maximum Transient Thermal Impedance

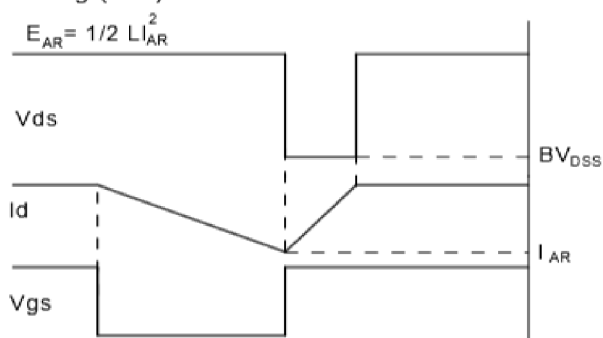
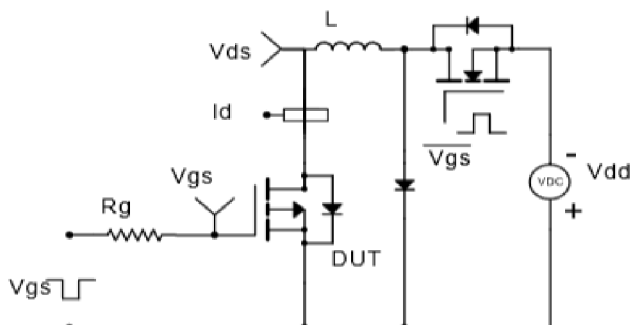
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

