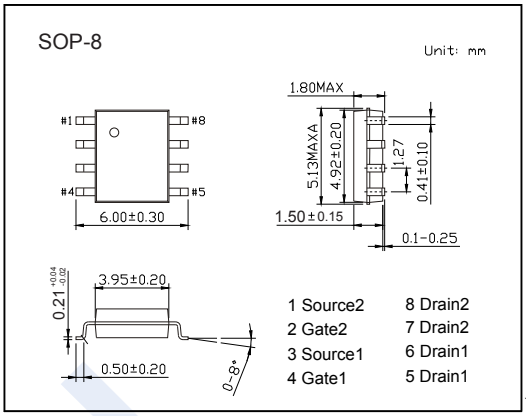
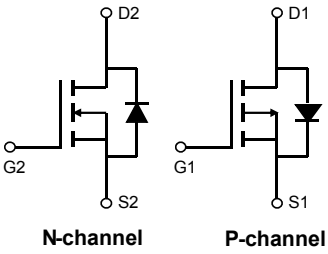
Complementary Trench MOSFET

2NP01



■ Features

- N-Channel: V_{DS}=30V I_D=6A
  $R_{DS(ON)}$ < 30mΩ (V_{GS} = 10V)
  $R_{DS(ON)}$ < 42mΩ (V_{GS} = 4.5V)
- P-Channel: V_{DS}=-30V I_D=-6.5A
  $R_{DS(ON)}$ < 28mΩ (V_{GS} =-10V)
  $R_{DS(ON)}$ < 44mΩ (V_{GS} =-4.5V)



N-channel **P-channel**

■ Absolute Maximum Ratings Ta = 25℃

Parameter		Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage		V_{DS}	30	-30	V
Gate-Source Voltage		V_{GS}	±20		
Continuous Drain Current	Ta = 25℃	I_D	6	-6.5	A
	Ta = 70℃		5	-5.3	
Pulsed Drain Current		I_{DM}	30	-30	
Avalanche Current		I_{AS}, I_{AR}	10	23	
Avalanche energy L=0.1mH		E_{AS}, E_{AR}	5	26	mJ
Power Dissipation	Ta = 25℃	P_D	2		W
	Ta = 70℃		1.3		
Thermal Resistance.Junction- to-Ambient	t ≤ 10s	R_{thJA}	62.5		℃/W
	Steady-State		90		
Thermal Resistance.Junction- to-Lead	Steady-State	R_{thJL}	40		
Junction Temperature		T_J	150		℃
Storage Temperature Range		T_{stg}	-55 to 150		

Complementary Trench MOSFET

2NP01

■ N-Channel Electrical Characteristics Ta = 25℃

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{DSS}	I_D=250μA, V_{GS}=0V	30			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=30V, V_{GS}=0V			1	μA
		V_{DS}=30V, V_{GS}=0V, T_J=55℃			5	
Gate-Body Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±20V			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS} , I_D=250μA	1.2	1.8	2.4	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=6A		25	30	mΩ
		V_{GS}=10V, I_D=6A T_J=125℃		40	48	
		V_{GS}=4.5V, I_D=5A		33.5	42	
On State Drain Current	$I_{D(ON)}$	V_{GS}=10V, V_{DS}=5V	30			A
Forward Transconductance	g_{FS}	V_{DS}=5V, I_D=6A		15		S
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=15V, f=1MHz	200	255	310	pF
Output Capacitance	C_{oss}		30	45	60	
Reverse Transfer Capacitance	C_{rss}		20	35	50	
Gate Resistance	R_g	V_{GS}=0V, V_{DS}=0V, f=1MHz	1.6	3.25	4.9	Ω
Total Gate Charge (10V)	Q_g	V_{GS}=10V, V_{DS}=15V, I_D=6A	4	5.2	6	nC
Total Gate Charge (4.5V)			2	2.55	3	
Gate Source Charge	Q_{gs}			0.85		
Gate Drain Charge	Q_{gd}			1.3		
Turn-On DelayTime	$t_{d(on)}$	V_{GS}=10V, V_{DS}=15V, R_L=2.5Ω,R_{GEN}=3Ω		4.5		ns
Turn-On Rise Time	t_r			2.5		
Turn-Off DelayTime	$t_{d(off)}$			14.5		
Turn-Off Fall Time	t_f			3.5		
Body Diode Reverse Recovery Time	t_{rr}	I_F= 6A, dI/dt= 100A/μs		8.5	12	
Body Diode Reverse Recovery Charge	Q_{rr}			2.2	3	nC
Maximum Body-Diode Continuous Current	I_S				2.5	A
Diode Forward Voltage	V_{SD}	I_S=1A,V_{GS}=0V		0.76	1	V

Complementary Trench MOSFET

2NP01

■ P-Channel Electrical Characteristics Ta = 25℃

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{DSS}	I_D=-250μA, V_{GS}=0V	-30			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-30V, V_{GS}=0V			-1	μA
		V_{DS}=-30V, V_{GS}=0V, T_J=55℃			-5	
Gate-Body leakage current	I_{GSS}	V_{DS}=0V, V_{GS}=±20V			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS} I_D=-250μA	-1.3	-1.85	-2.4	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-6.5A		22	28	mΩ
		V_{GS}=-10V, I_D=-6.5A T_J=125℃		32	40	
		V_{GS}=-4.5V, I_D=-5A		34	44	
On state drain current	$I_{D(ON)}$	V_{GS}=-10V, V_{DS}=-5V	-30			A
Forward Transconductance	g_{FS}	V_{DS}=-5V, I_D=-6.5A		18		S
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=-15V, f=1MHz		760		pF
Output Capacitance	C_{oss}			140		
Reverse Transfer Capacitance	C_{rss}			95		
Gate resistance	R_g	V_{GS}=0V, V_{DS}=0V, f=1MHz	1.5	3.2	5	Ω
Total Gate Charge (10V)	Q_g	V_{GS}=-10V, V_{DS}=-15V, I_D=-6.5A		13.6	16	nC
Total Gate Charge (4.5V)				6.7	8	
Gate Source Charge	Q_{gs}			2.5		
Gate Drain Charge	Q_{gd}			3.2		
Turn-On DelayTime	$t_{d(on)}$	V_{GS}=-10V, V_{DS}=-15V, R_L=2.3Ω,R_{GEN}=3Ω		8		ns
Turn-On Rise Time	t_r			6		
Turn-Off DelayTime	$t_{d(off)}$			17		
Turn-Off Fall Time	t_f			5		
Body Diode Reverse Recovery Time	t_{rr}	I_F=-6.5A, dI/dt=100A/μs		15		
Body Diode Reverse Recovery Charge	Q_{rr}			9.7		nC
Maximum Body-Diode Continuous Current	I_S				-2.5	A
Diode Forward Voltage	V_{SD}	I_S=-1A,V_{GS}=0V		-0.8	-1	V

■ Marking

Marking	NP01 KA****

Complementary Trench MOSFET

2NP01

■ N-Channel Typical Characterisitics

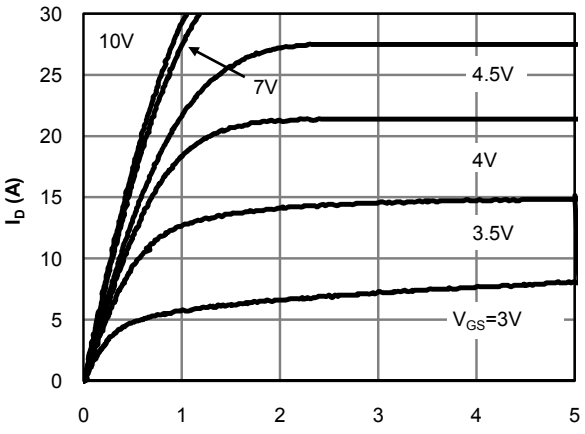


Fig 1: On-Region Characteristics

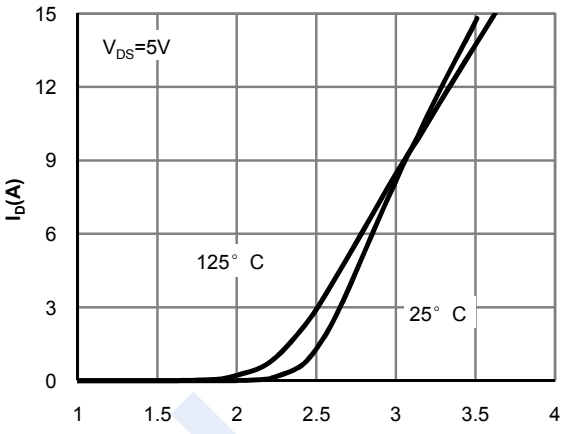


Figure 2: Transfer Characteristics

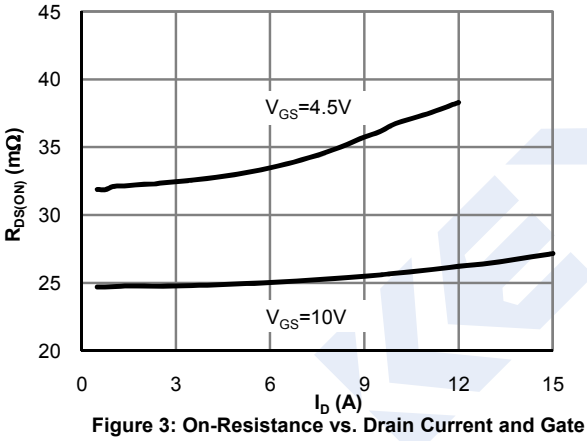


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

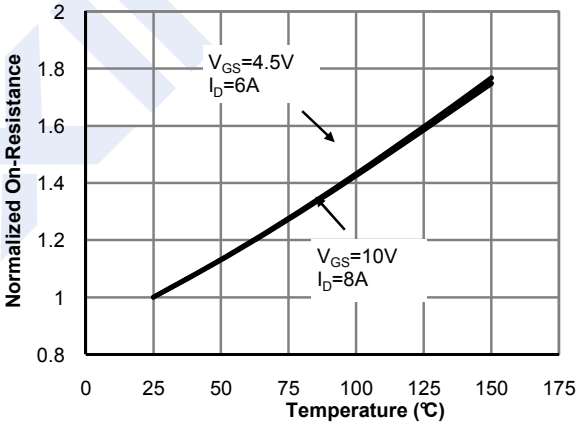


Figure 4: On-Resistance vs. Junction Temperature

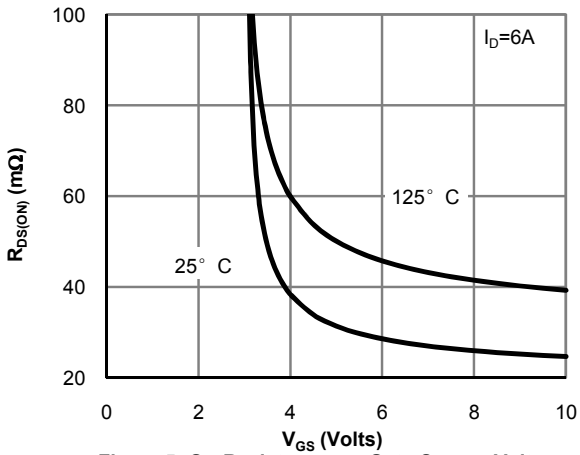


Figure 5: On-Resistance vs. Gate-Source Voltage

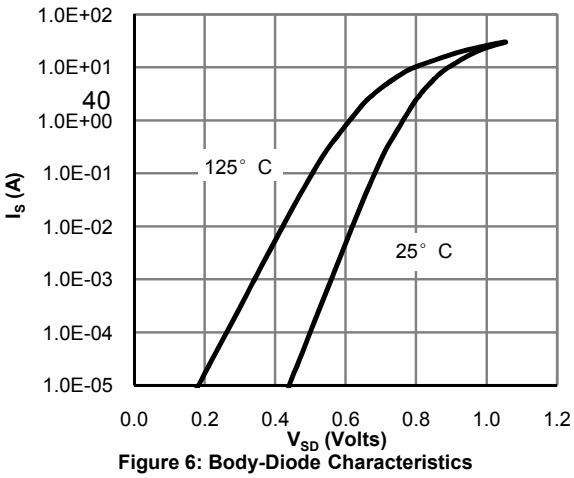


Figure 6: Body-Diode Characteristics

Complementary Trench MOSFET

2NP01

■ N-Channel Typical Characterisitics

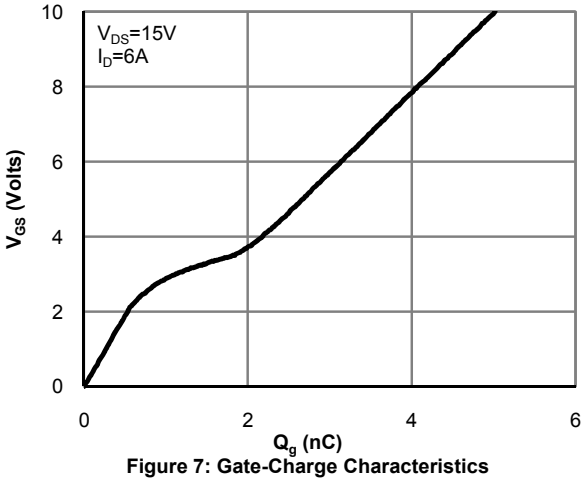


Figure 7: Gate-Charge Characteristics

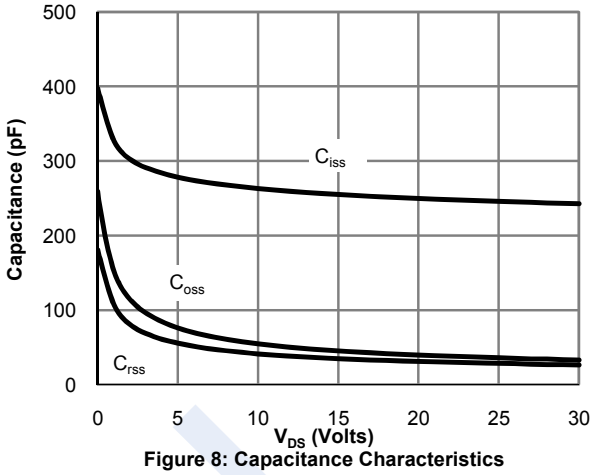


Figure 8: Capacitance Characteristics

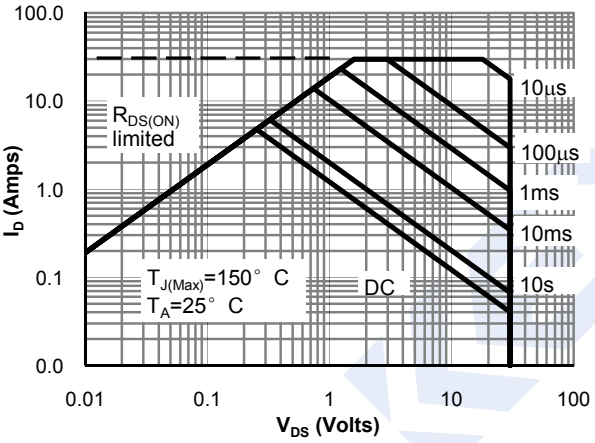


Figure 9: Maximum Forward Biased Safe Operating Area

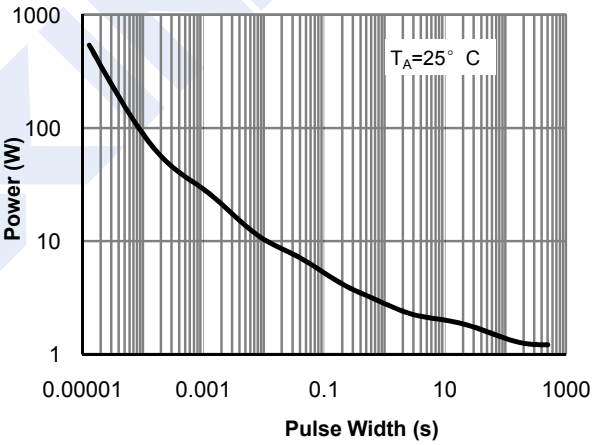


Figure 10: Single Pulse Power Rating Junction-to-Ambient

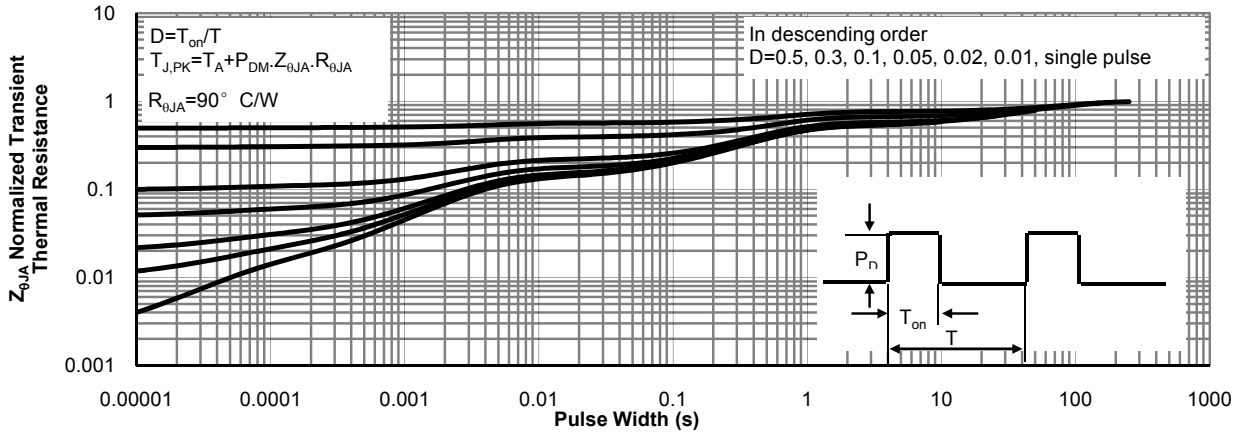


Figure 11: Normalized Maximum Transient Thermal Impedance

Complementary Trench MOSFET

2NP01

■ P-Channel Typical Characterisitics

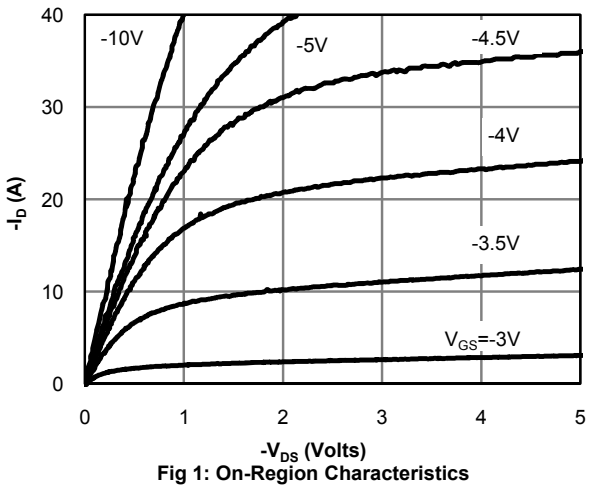


Fig 1: On-Region Characteristics

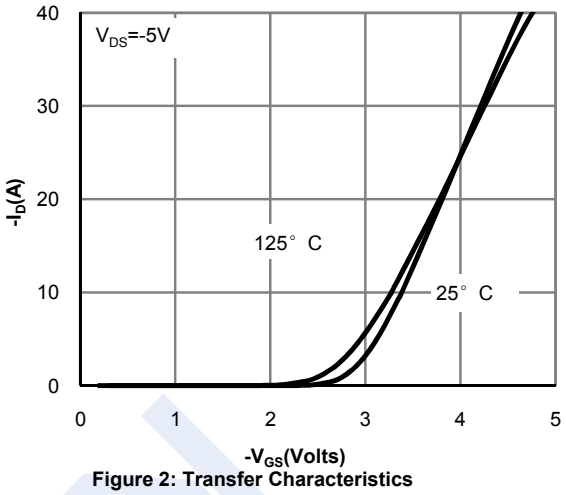


Figure 2: Transfer Characteristics

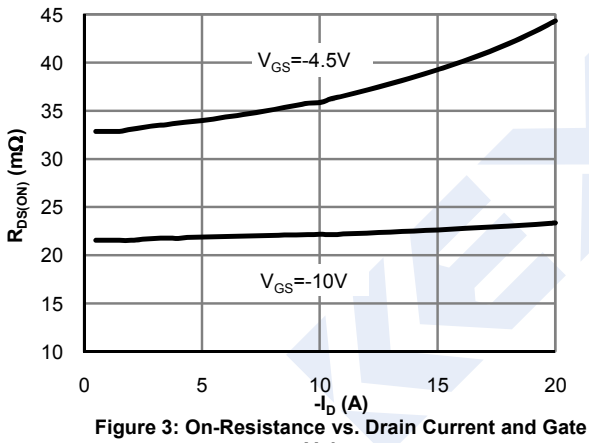


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

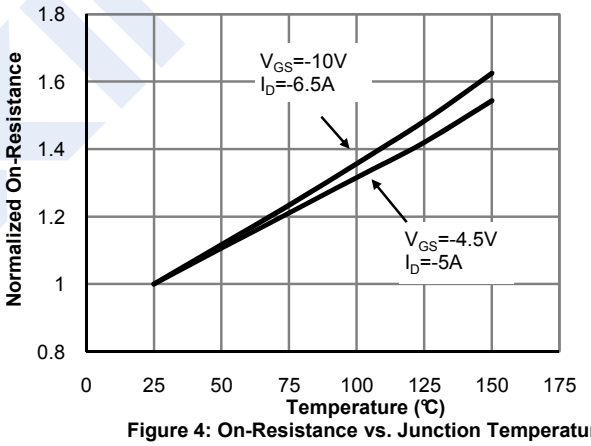


Figure 4: On-Resistance vs. Junction Temperature

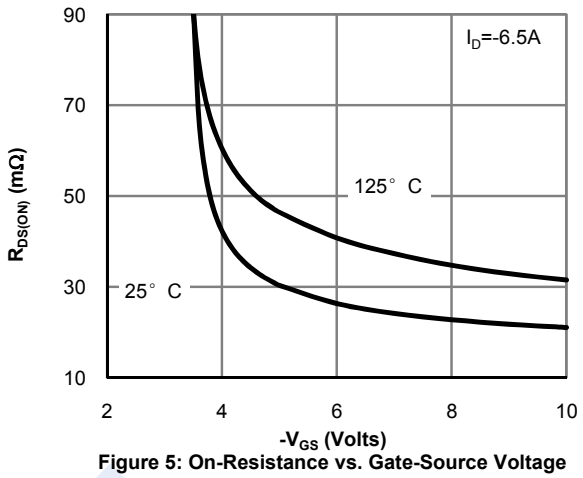


Figure 5: On-Resistance vs. Gate-Source Voltage

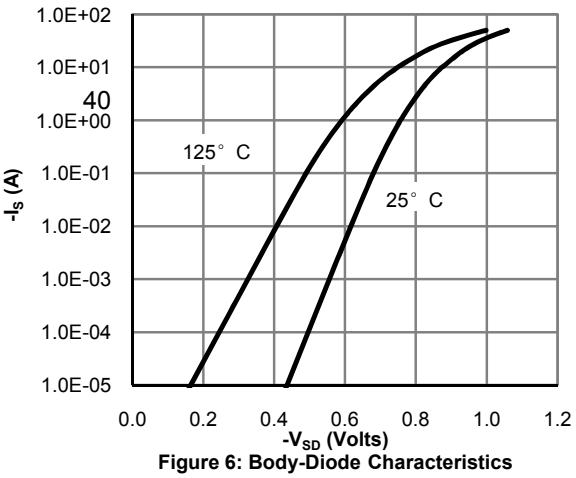


Figure 6: Body-Diode Characteristics

Complementary Trench MOSFET

2NP01

■ P-Channel Typical Characterisitics

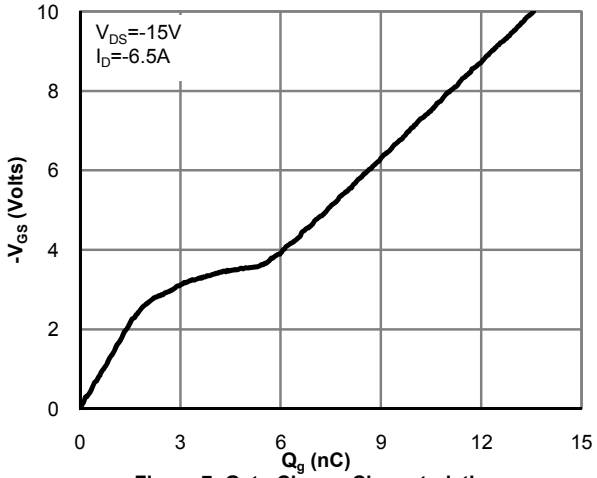


Figure 7: Gate-Charge Characteristics

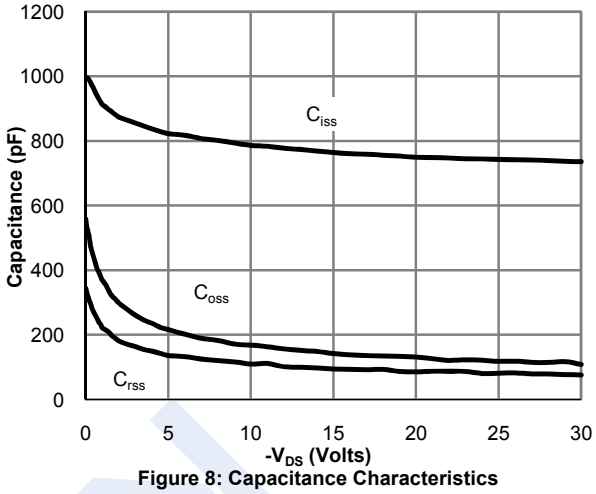


Figure 8: Capacitance Characteristics

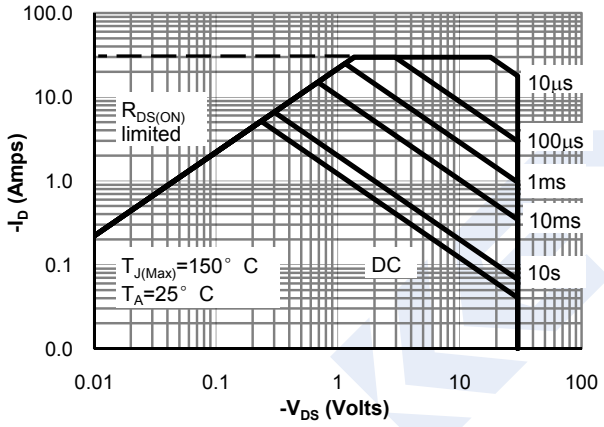


Figure 9: Maximum Forward Biased Safe Operating Area

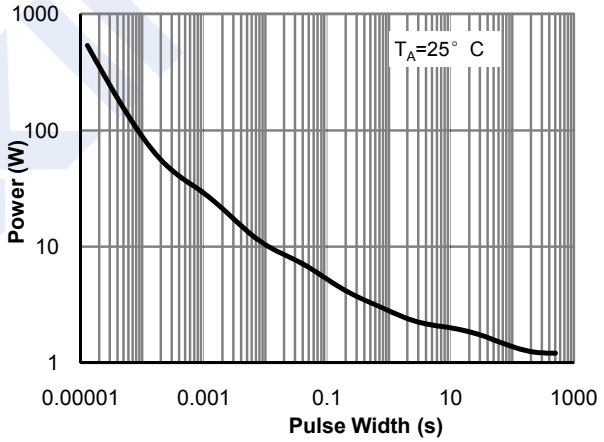


Figure 10: Single Pulse Power Rating Junction-to-Ambient

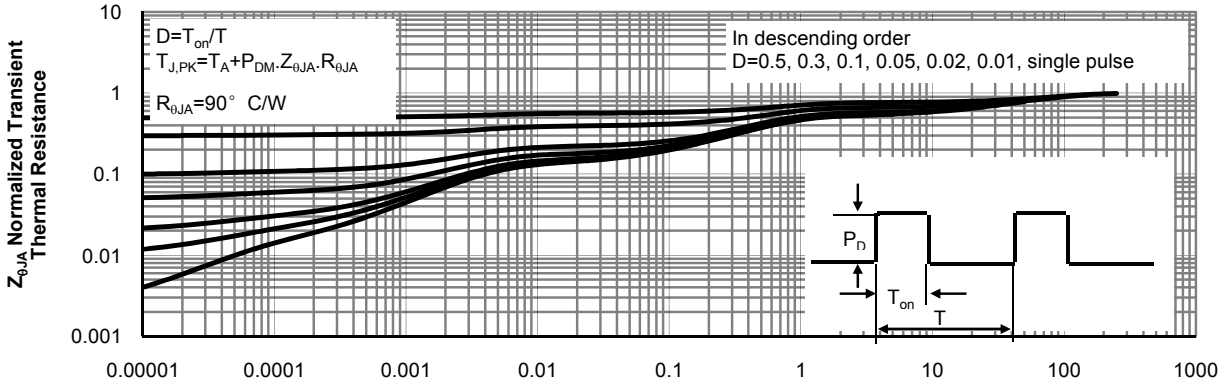


Figure 11: Normalized Maximum Transient Thermal Impedance