

Dual N & P-Channel PowerTrench[®] MOSFET

N-Channel: 40V, 30A, 24mΩ P-Channel: -40V, -30A, 30mΩ

Features

n-chann

$$V_{DS} (V) = 40V, I_D = 30A (V_{GS}=10V)$$

$$R_{DS(ON)} < 24m\Omega (V_{GS}=10V)$$

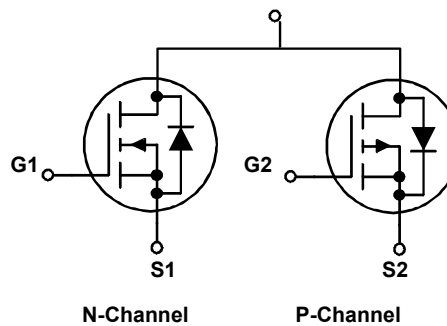
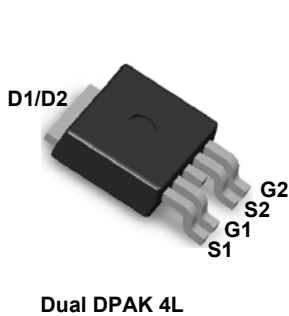
$$R_{DS(ON)} < 30m\Omega (V_{GS}=4.5V)$$

p-channel

$$V_{DS} (V) = -40V, I_D = -30A (V_{GS}=-10V)$$

$$R_{DS(ON)} < 30m\Omega (V_{GS} = -10V)$$

$$R_{DS(ON)} < 36m\Omega (V_{GS} = -4.5V)$$



ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$, unless otherwise noted)

PARAMETER	SYMBOL	N-CHANNEL	P-CHANNEL	UNIT	
Drain-Source Voltage	V_{DS}	40	- 40	V	
Gate-Source Voltage	V_{GS}	± 20			
Continuous Drain Current ^a	I_D	$T_C = 25^\circ\text{C}$	30	-30	A
		$T_C = 125^\circ\text{C}$	35	-35	
Continuous Source Current (Diode Conduction) ^a	I_S	30	-30		
Pulsed Drain Current ^b	I_{DM}	150	-150		
Single Pulse Avalanche Current	I_{AS}	L = 0.1 mH	30		mJ
Single Pulse Avalanche Energy			E_{AS}	245	
Maximum Power Dissipation ^b	P_D	$T_C = 25^\circ\text{C}$	108	108	W
		$T_C = 125^\circ\text{C}$	32	32	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to + 175			$^\circ\text{C}$
Soldering Recommendations (Peak Temperature)		260			

THERMAL RESISTANCE RATINGS

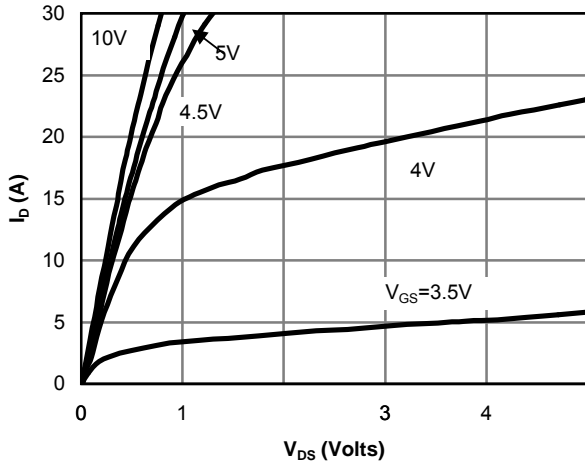
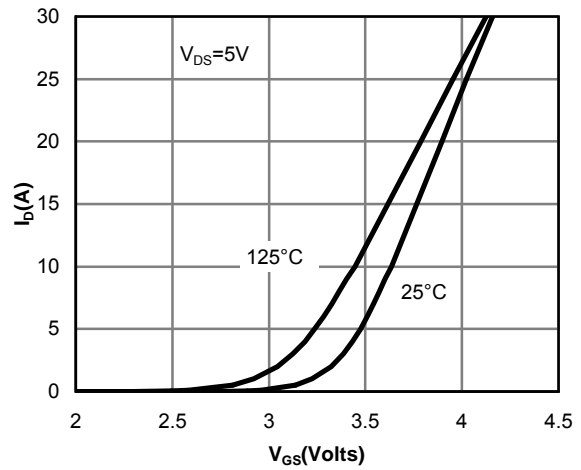
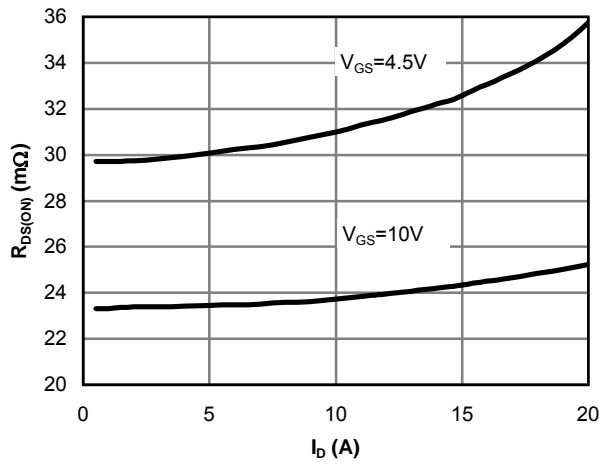
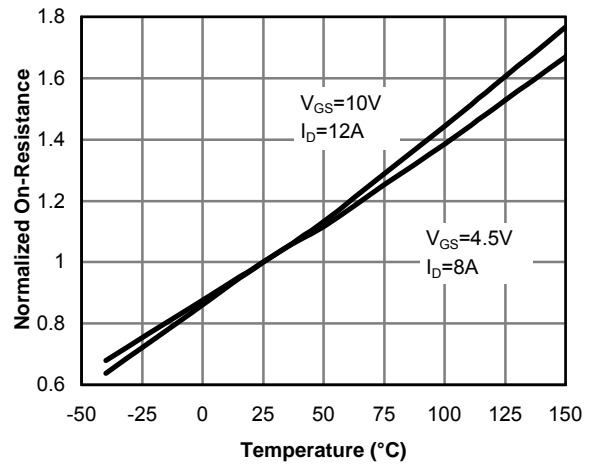
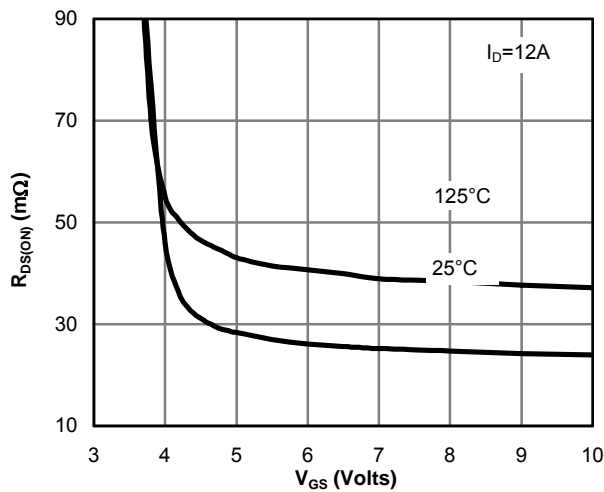
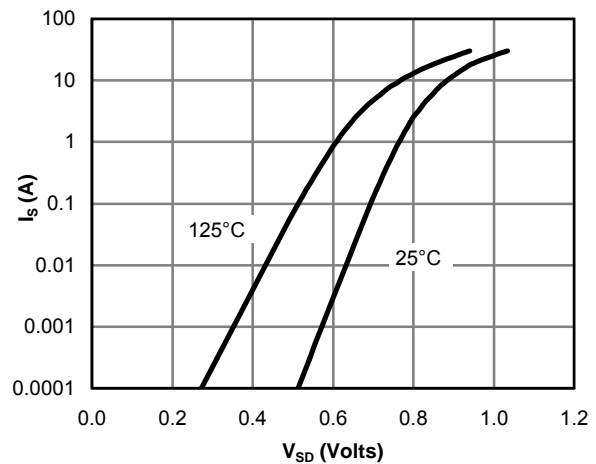
PARAMETER	SYMBOL	N-CHANNEL	P-CHANNEL	UNIT
Junction-to-Ambient	R_{thJA}	85	85	$^\circ\text{C/W}$
Junction-to-Case (Drain)				

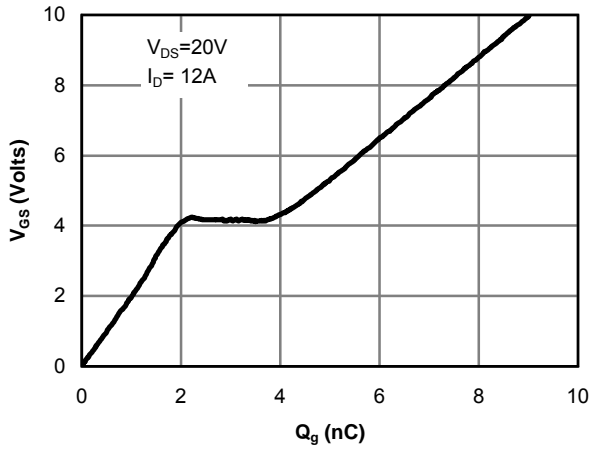
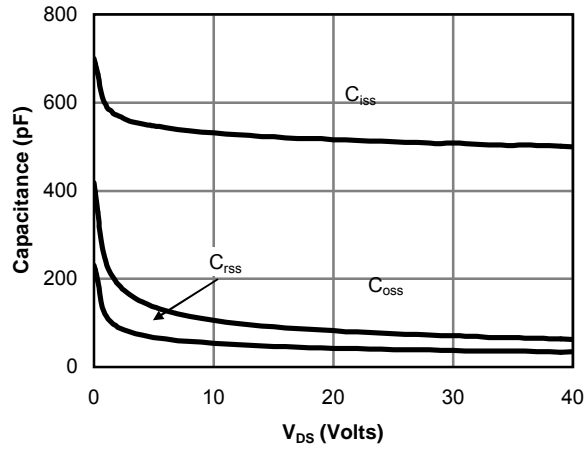
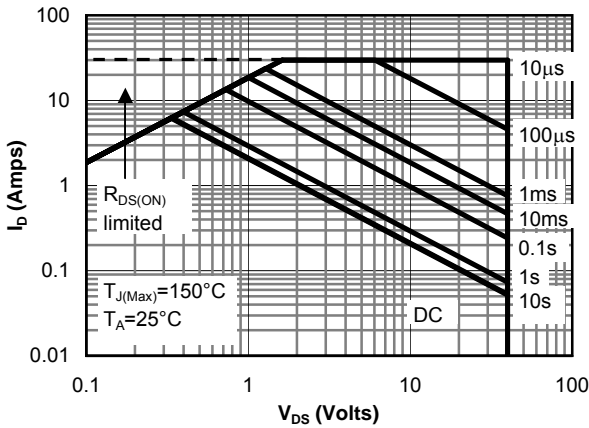
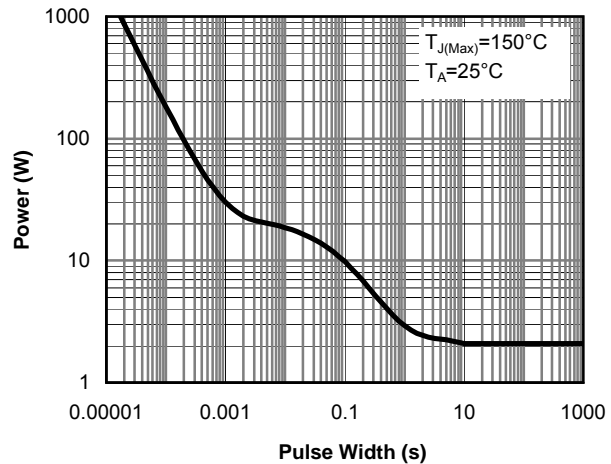
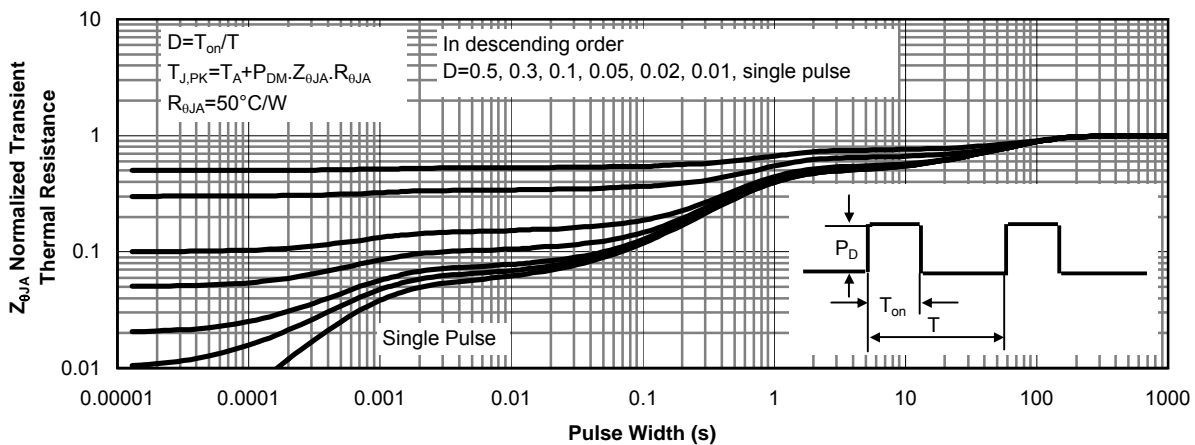
Notes

- Package limited.
- Pulse test; pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2\%$.
- When mounted on 1" square PCB (FR4 material).
- Parametric verification ongoing.

N Channel Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

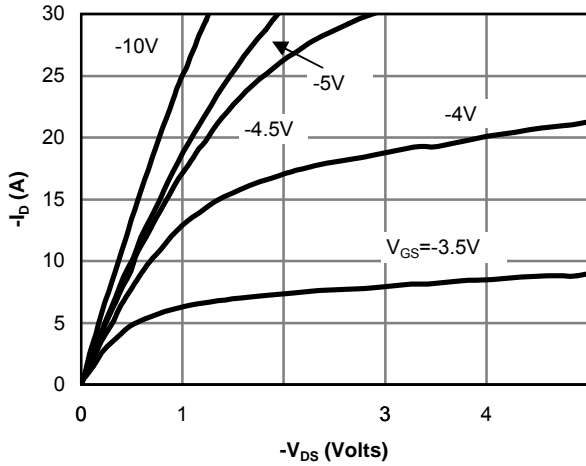
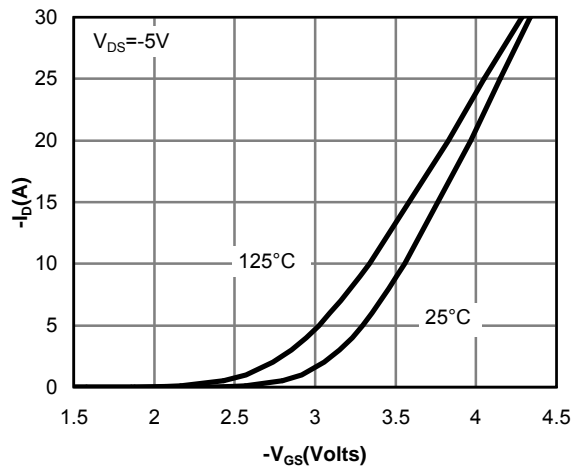
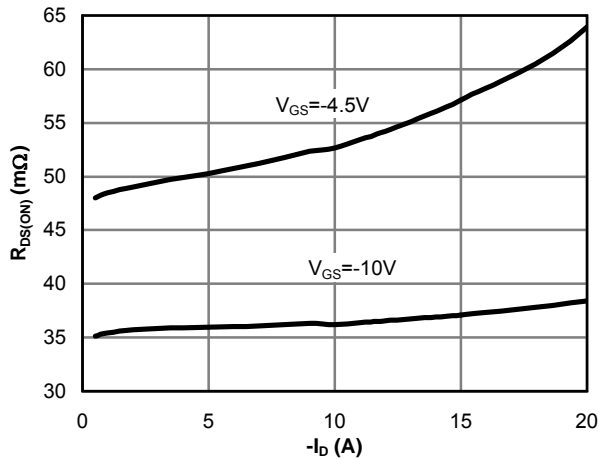
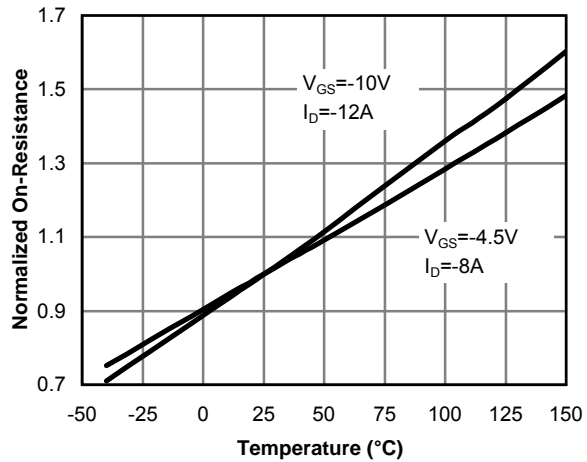
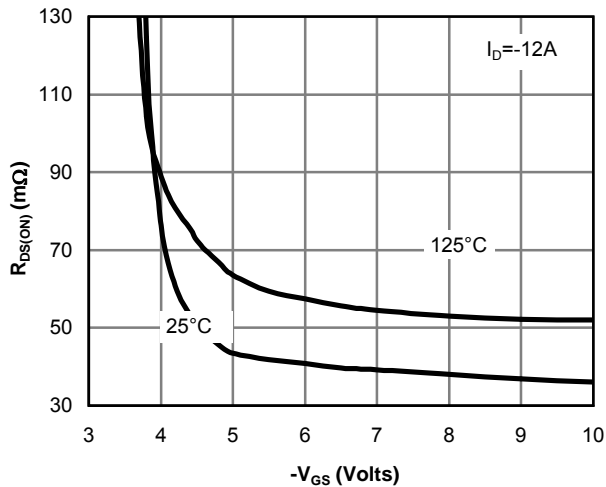
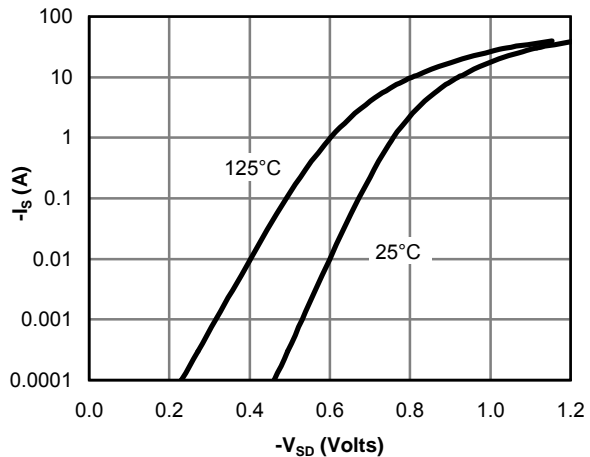
Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	40			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=40\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1 5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1.7	2.5	3	V
$I_{D(ON)}$	On state drain current	$V_{GS}=10\text{V}$, $V_{DS}=5\text{V}$	30			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$, $I_D=30\text{A}$		24		m Ω
		$V_{GS}=4.5\text{V}$, $I_D=20\text{A}$		30		
g_{FS}	Forward Transconductance	$V_{DS}=10\text{V}$, $I_D=30\text{A}$		23		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}$, $V_{GS}=0\text{V}$		0.76	1	V
I_S	Maximum Body-Diode Continuous Current				2	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=20\text{V}$, $f=1\text{MHz}$		1000	1500	pF
C_{oss}	Output Capacitance			150		pF
C_{riss}	Reverse Transfer Capacitance			100		pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$		1.5	3.5	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$, $V_{DS}=20\text{V}$, $I_D=30\text{A}$		8.3	10.8	nC
Q_{gs}	Gate Source Charge			2.3		nC
Q_{gd}	Gate Drain Charge			1.6		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=10\text{V}$, $V_{DS}=20\text{V}$, $R_L=1.4\Omega$, $R_{GEN}=3\Omega$		6.4		ns
t_r	Turn-On Rise Time			3.6		ns
$t_{D(off)}$	Turn-Off DelayTime			16.2		ns
t_f	Turn-Off Fall Time			6.6		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=12\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		18	24	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=12\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		10		nC

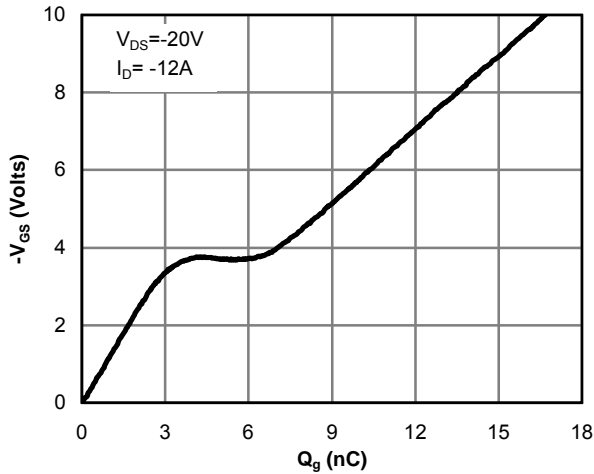
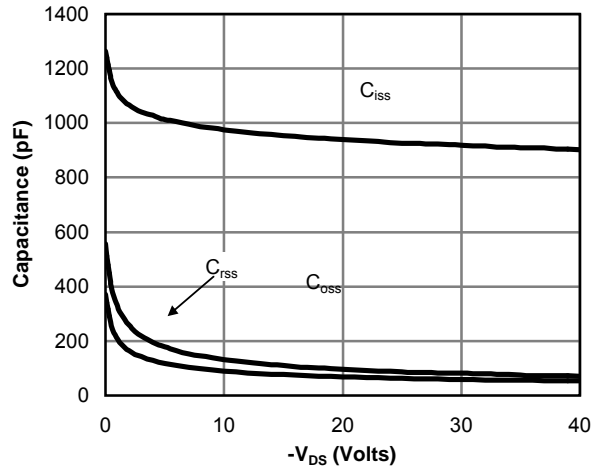
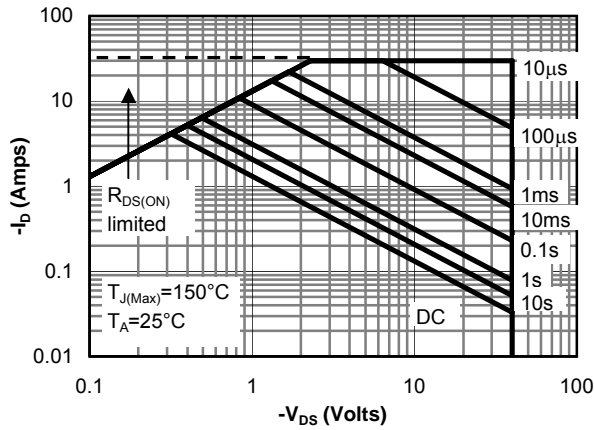
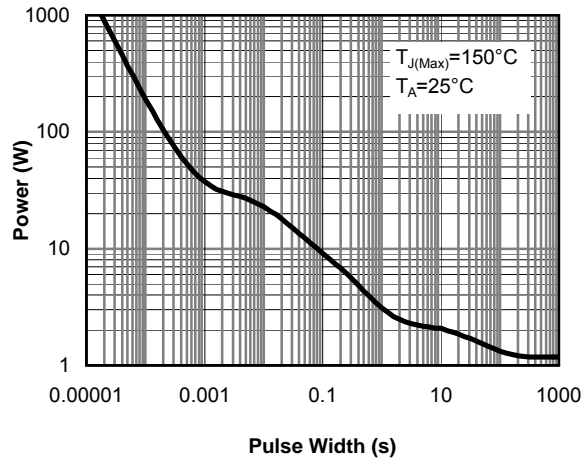
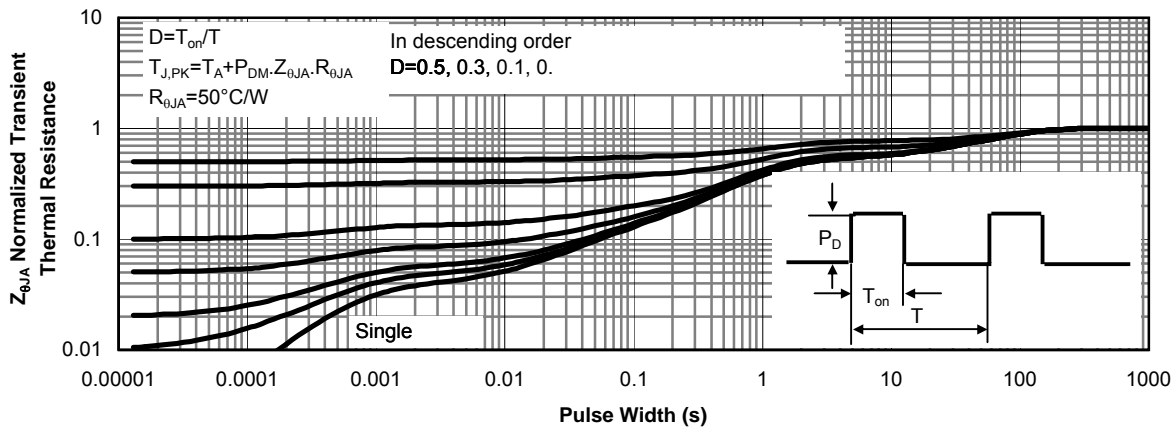
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CHANNEL

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 (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV _{DSS}	Drain-Source Breakdown Voltage	I _D = -250μA, V _{GS} =0V	-40			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -40V, V _{GS} =0V T _J =55°C			-1 -5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} = ±20V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} I _D = -250μA	-1.7	-2	-3	V
I _{D(ON)}	On state drain current	V _{GS} = -10V, V _{DS} = -5V	-30			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} = -10V, I _D = -30A		30		mΩ
		V _{GS} = -4.5V, I _D = -20A		36		
g _{FS}	Forward Transconductance	V _{DS} = -10V, I _D = -30A		22		S
V _{SD}	Diode Forward Voltage	I _S = -1A, V _{GS} =0V		-0.76	-1	V
I _S	Maximum Body-Diode Continuous Current				-2	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} = -20V, f=1MHz		1500	2600	pF
C _{oss}	Output Capacitance			200		pF
C _{rss}	Reverse Transfer Capacitance			150		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		10		Ω
SWITCHING PARAMETERS						
Q _g (-10V)	Total Gate Charge	V _{GS} = -10V, V _{DS} = -20V, I _D = -30A		16.2	21	nC
Q _g (-4.5V)	Total Gate Charge			7.2	9.4	nC
Q _{gs}	Gate Source Charge			3.8		nC
Q _{gd}	Gate Drain Charge			3.5		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} = -10V, V _{DS} = -20V, R _L =1.4Ω, R _{GEN} =3Ω		6.2		ns
t _r	Turn-On Rise Time			8.4		ns
t _{D(off)}	Turn-Off DelayTime			44.8		ns
t _f	Turn-Off Fall Time			41.2		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F = -12A, dI/dt=100A/μs		21	27	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F = -12A, dI/dt=100A/μs		14		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