

N-Ch 500V Fast Switching MOSFETs

- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Excellent CdV/dt effect decline
- ★ Advanced VD MOSFETS

Product Summary



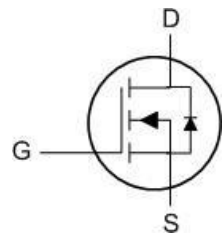
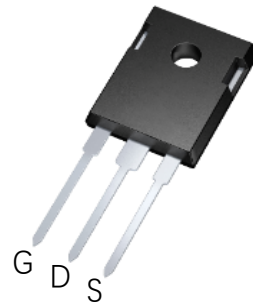
BVDSS	RDSON	ID
500V	0.23Ω	25A

Description

The XRT25N50HS is the Advanced VD N-ch MOSFETS, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The XRT25N50HS meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

TO247 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	500	V
V_{GS}	Gate-Source Voltage	± 30	V
$I_D@T_C=25^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V ^{1,6}	25	A
$I_D@T_C=100^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V ^{1,6}	16	A
I_{DM}	Pulsed Drain Current ²	100	A
EAS	Single Pulse Avalanche Energy ³	866	mJ
I_{AS}	Avalanche Current	---	A
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation ⁴	33	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	---	50	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	3.8	$^\circ\text{C/W}$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=250\mu A$	500	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C , $I_D=1mA$	---	---	---	$V/^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10V$, $I_D=12.5A$	---	0.23	0.30	Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	2	3	4	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	---	---	$mV/^\circ\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=500V$, $V_{GS}=0V$, $T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=500V$, $V_{GS}=0V$, $T_J=150^\circ\text{C}$	---	---	---	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 30V$, $V_{DS}=0V$	---	---	± 100	nA
g_{fs}	Forward Transconductance	$V_{DS}=20V$, $I_D=21.5A$	---	---	---	S
R_g	Gate Resistance	$V_{DS}=0V$, $V_{GS}=0V$, $f=1MHz$	---	---	---	Ω
Q_g	Total Gate Charge	$V_{DS}=250V$, $V_{GS}=0$ to $10V$, $I_D=25A$	---	69	---	nC
Q_{gs}	Gate-Source Charge		---	19.2	---	
Q_{gd}	Gate-Drain Charge		---	21.8	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{GS}=10V$, $V_{DS}=250V$, $R_G=24\Omega$, $I_D=25A$	---	48	---	ns
T_r	Rise Time		---	68	---	
$T_{d(off)}$	Turn-Off Delay Time		---	197	---	
T_f	Fall Time		---	79	---	
C_{iss}	Input Capacitance	$V_{DS}=25V$, $V_{GS}=0V$, $f=1MHz$	---	3415	---	pF
C_{oss}	Output Capacitance		---	305	---	
C_{rss}	Reverse Transfer Capacitance		---	32	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current ^{1,4}	$V_G=V_D=0V$, Force Current	---	---	25	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V$, $I_S=25A$, $T_J=25^\circ\text{C}$	---	---	1.2	V
t_{rr}	Reverse Recovery Time	$I_F=25$, $di/dt=100A/\mu s$, $T_J=25^\circ\text{C}$	---	475	---	nS
Q_{rr}	Reverse Recovery Charge		---	6.8	---	nC

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. E_{AS} condition: Starting $T_J=25^\circ\text{C}$, $V_{DD}=50V$, $V_G=10V$, $R_G=25\Omega$, $L=10mH$, $I_{AS}=13A$
3. $R_{\theta JA}$ is measured with the device mounted on a minimum recommended pad of 2oz copper FR4 PCB
4. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$.

Typical Performance Characteristics

Figure 1: Output Characteristics

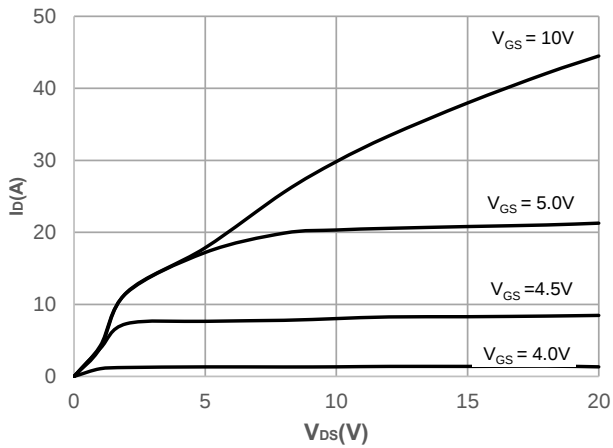


Figure 2: Typical Transfer Characteristics

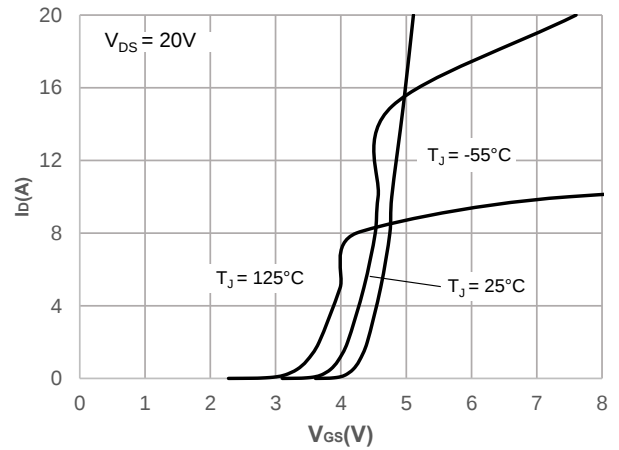


Figure 3: On-resistance vs. Drain Current

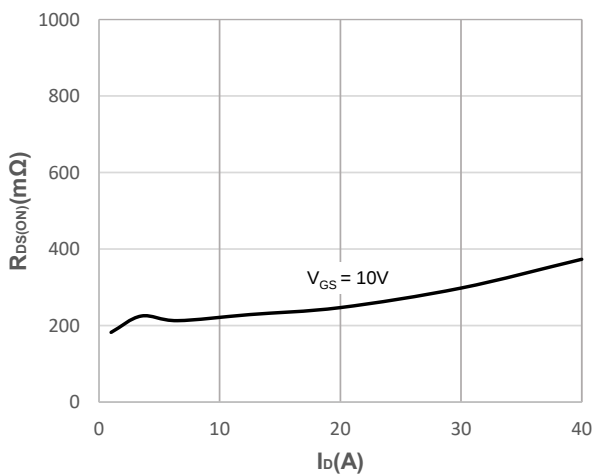


Figure 4: Body Diode Characteristics

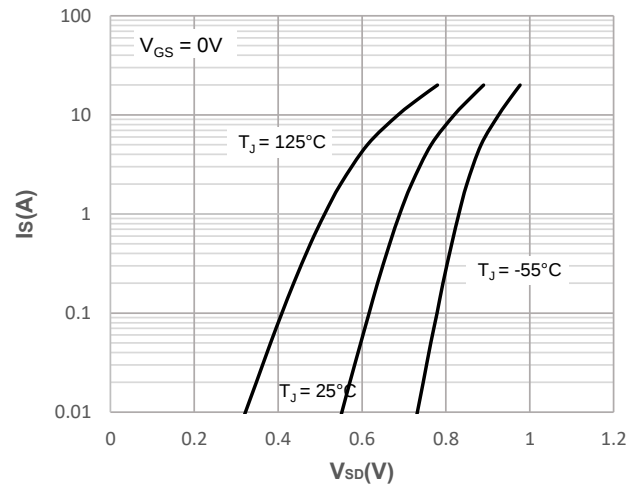


Figure 5: Gate Charge Characteristics

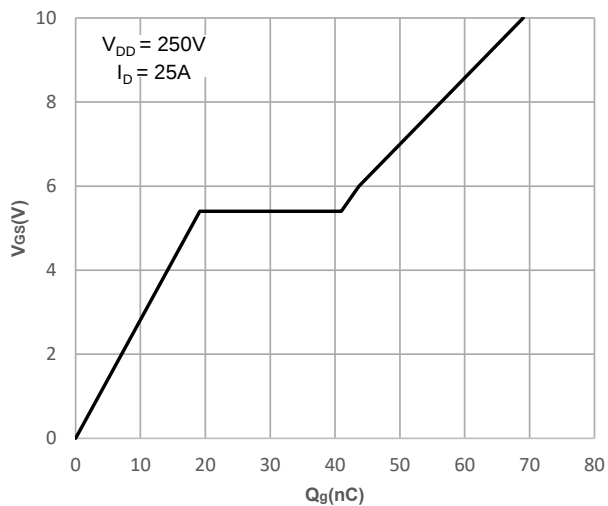
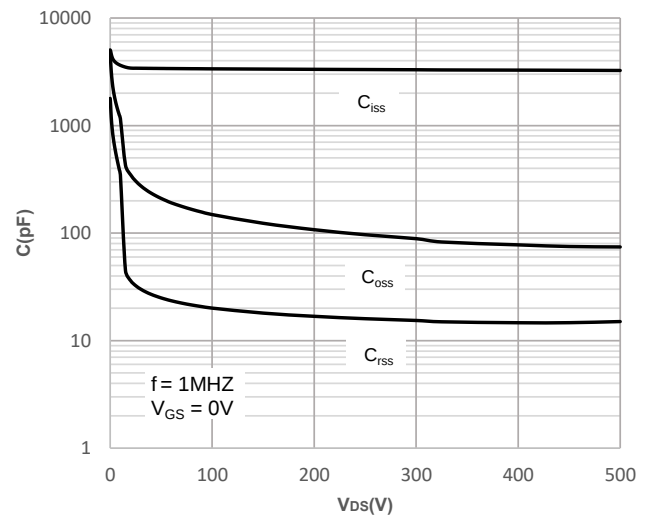


Figure 6: Capacitance Characteristics



Typical Performance Characteristics

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

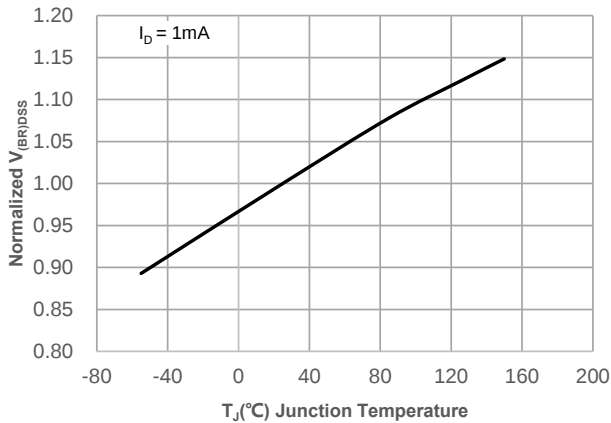


Figure 8: Normalized on Resistance vs. Junction Temperature

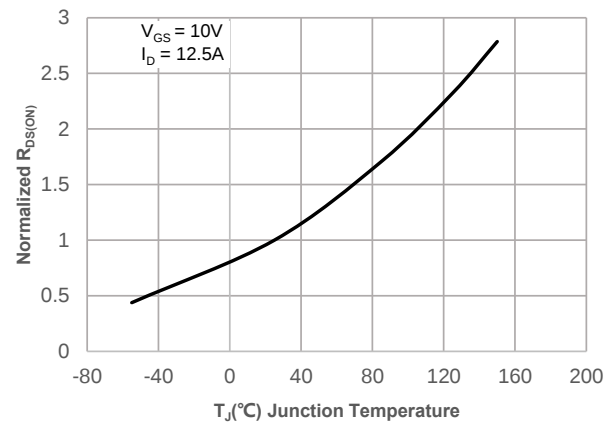


Figure 9: Maximum Safe Operating Area

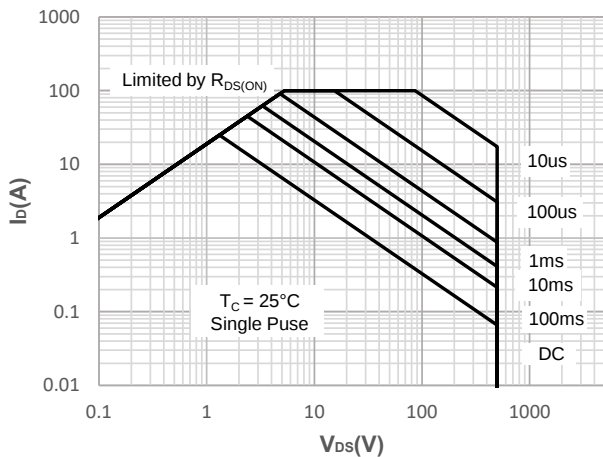


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

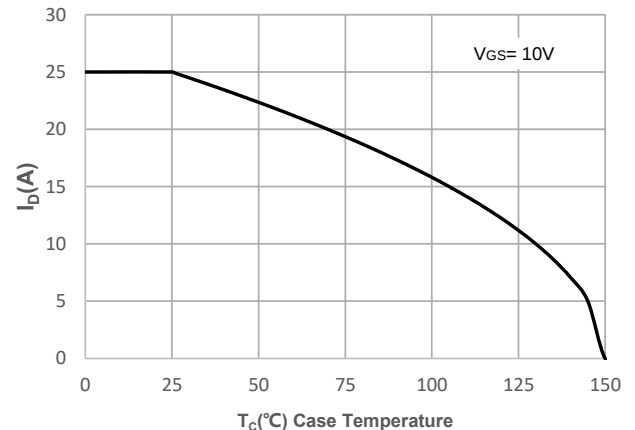


Figure 11: Normalized Maximum Transient Thermal Impedance

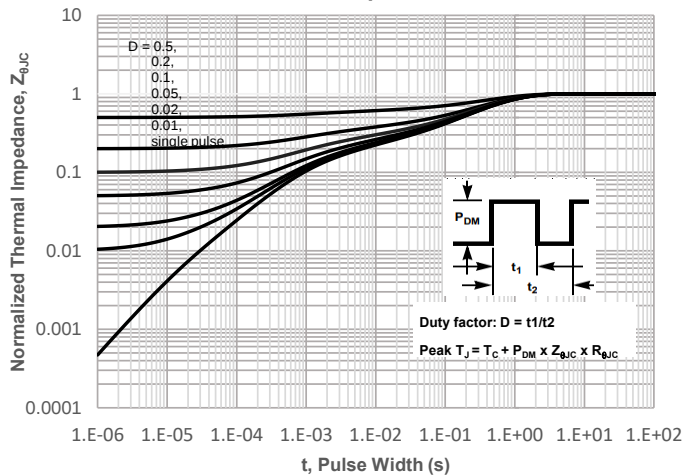
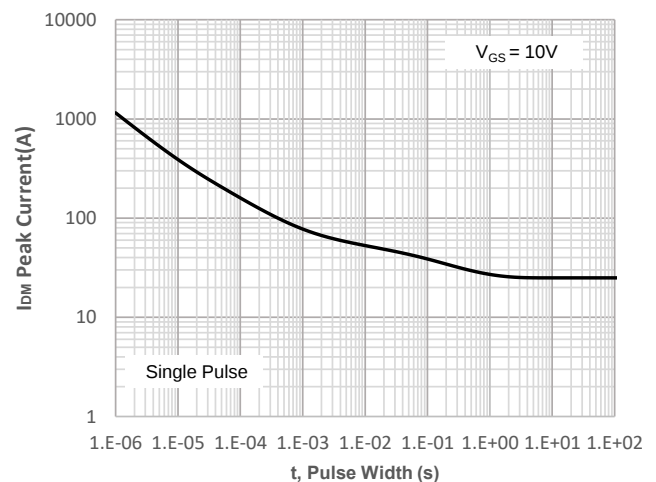
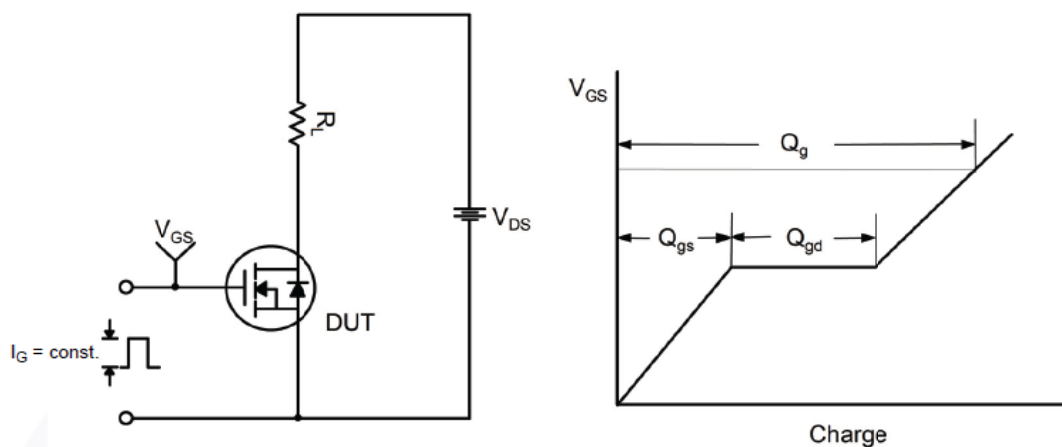


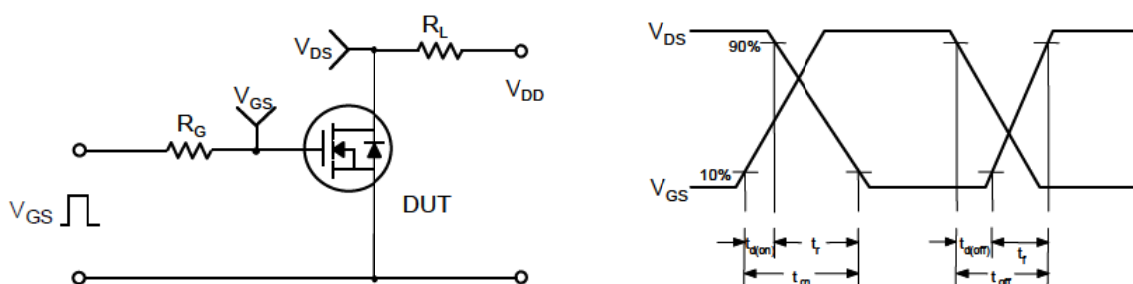
Figure 12: Peak Current Capacity



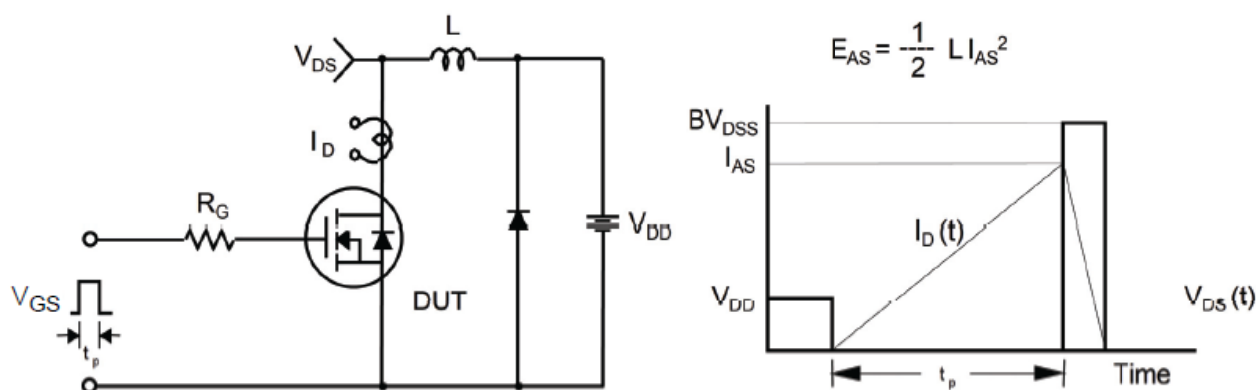
Gate Charge Test Circuit & Waveform



Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Mechanical Dimensions for TO247

COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	4.80	5.20
A1	2.21	2.61
A2	1.85	2.15
b	1.11	1.36
b2	1.91	2.21
b4	2.91	3.21
c	0.51	0.75
D	20.70	21.30
D1	16.25	16.85
E	15.50	16.10
E1	13.00	13.60
E2	4.80	5.20
E3	2.30	2.70
e	5.44BSC	
L	19.62	20.22
L1	—	4.30
ØP	3.40	3.80
ØP1	—	7.30
S	6.15BSC	

