



XTMF150N09E

1500V N-ch Planar MOSFET

Product Description

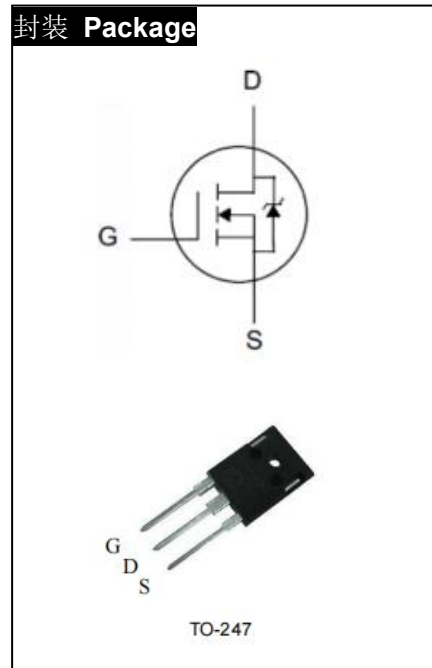
BV_{DSS}	1500	V
I_D	9	A
$R_{DS(ON), Typ.}$	2.8	Ω

General Features

- RoHS Compliant
- $R_{DS(ON), typ.} = 2.8\Omega @ V_{GS} = 10V$
- Fast Recovery Body Diode
- Low Gate Charge Minimize Switching Loss

Applications

- Adaptor
- Charger
- SMPS Standby Power



Device	Package	Marking
XTMF150N09E	TO-247	XTMF150N09E

Absolute Maximum Ratings $T_j = 25^\circ\text{C}$

Symbol	Parameter	XTMF150N09E	Unit
V_{DSS}	Drain-to-Source Voltage	1500	V
V_{GSS}	Gate-to-Source Voltage	± 30	
I_D	Continuous Drain Current	9	A
I_{DM}	Pulsed Drain Current at $V_{GS} = 10V$	36	
E_{AS}	Single Pulse Avalanche Energy	450	mJ
P_D	Power Dissipation	320	W
	Derating Factor above 25°C	2.56	W/ $^\circ\text{C}$
T_L	Soldering Temperature Distance of 1.6mm from case for 10 seconds	300	$^\circ\text{C}$
$T_J \& T_{STG}$	Operating and Storage Temperature Range	-55 to 150	



Caution: Stresses greater than those listed in the “Absolute Maximum Ratings” may cause permanent damage to the device.

Thermal Characteristics

Symbol	Parameter	XTMF150N09E	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.39	$^{\circ}C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	55	$^{\circ}C/W$

Electrical Characteristics $T_j=25^{\circ}C$

OFF Characteristics

Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
BV_{DSS}	Drain-to-Source Breakdown Voltage	1500	-	-	V	$V_{GS}=0V, I_D=250\mu A$
I_{DSS}	Drain-to-Source Leakage Current	-	-	1	uA	$V_{DS}=1500V, V_{GS}=0V$
		-	-	500		$V_{DS}=1200V, V_{GS}=0V,$ $T_j=125^{\circ}C$
I_{GSS}	Gate-to-Source Leakage Current	-	-	+100	nA	$V_{GS}=+30V, V_{DS}=0V$
		-	-	-100		$V_{GS}=-30V, V_{DS}=0V$

ON Characteristics

Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	-	2.8	4	Ω	$V_{GS}=10V, I_D=5.4A$
$V_{GS(TH)}$	Gate Threshold Voltage	2.5	-	4.5	V	$V_{DS}=V_{GS}, I_D=250\mu A$



Dynamic Characteristics

Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
C_{iss}	Input Capacitance	-	3383	-	pF	$V_{GS}=0V$, $V_{DS}=25V$, $f=1.0MHz$
C_{rss}	Reverse Transfer Capacitance	-	54.8	-		
C_{oss}	Output Capacitance	-	178	-		
R_g	Gate input resistance	-	1.17	-	Ω	$f=1\text{ MHz}$ Gate DC Bias=0 Test signal level=20mV open drain
Q_g	Total Gate Charge	-	70	-	nC	$V_{DD}=750V$, $I_D=9A$, $V_{GS}=0$ to 10V
Q_{gs}	Gate-to-Source Charge	-	21.1	-		
Q_{gd}	Gate-to-Drain (Miller) Charge	-	23	-		

Resistive Switching Characteristics

Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
$t_{d(ON)}$	Turn-on Delay Time	-	67	-	ns	$V_{DD}=750V$, $I_D=9A$, $V_{GS}=10V$ $R_g=25\Omega$
t_{rise}	Rise Time	-	189	-		
$t_{d(OFF)}$	Turn-Off Delay Time	-	84	-		
t_{fall}	Fall Time	-	116	-		

Source-Drain Body Diode Characteristics

Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
I_{SD}	Continuous Source Current ^[1]	-	-	9.0	A	Integral pn-diode in MOSFET
I_{SM}	Pulsed Source Current ^[1]	-	-	36		
V_{SD}	Diode Forward Voltage	-	-	1.3	V	$I_S=9A$, $V_{GS}=0V$



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t_{rr}	Reverse Recovery Time	-	461	-	ns	$V_{GS}=0V$ $I_F=9.0A$, $di/dt=100A/\mu s$
Q_{rr}	Reverse Recovery Charge	-	3.36	-	μC	

[1] Pulse width $\leq 380\mu s$; duty cycle $\leq 2\%$



Typical Characteristics

Figure 1.Safe operating area

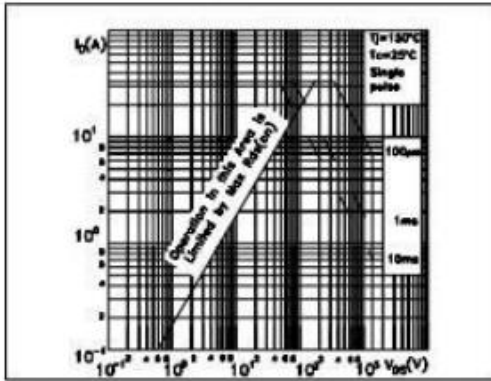


Figure 2.Thermal impedance

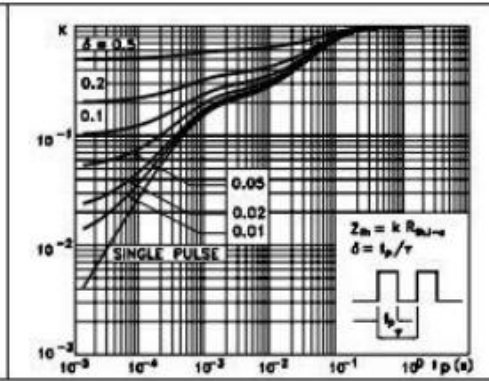


Figure 3.Output characteristics

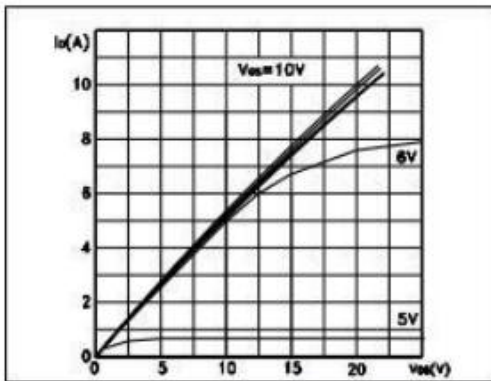


Figure 4.Transfer characteristics

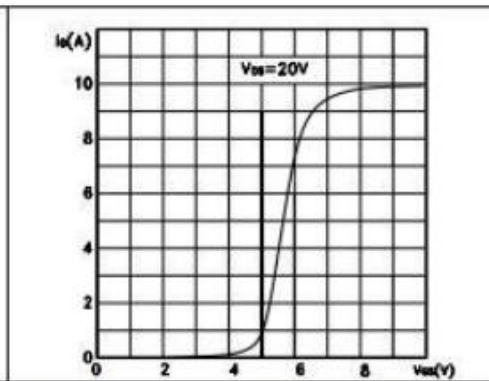


Figure 5.Normalized BV_{DSS} vs temperature

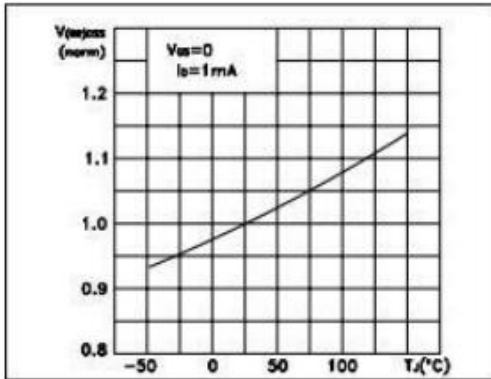
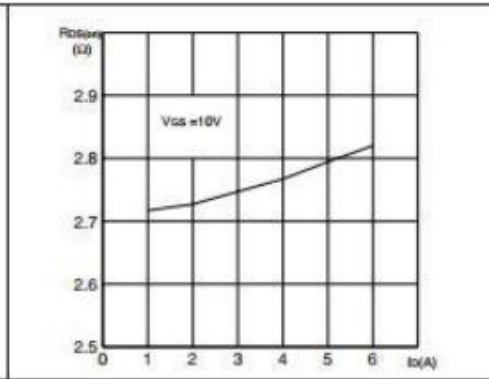


Figure 6.Static drain-source on resistance





Typical Characteristics(Cont.)

Figure 7. Gate charge vs gate-source voltage

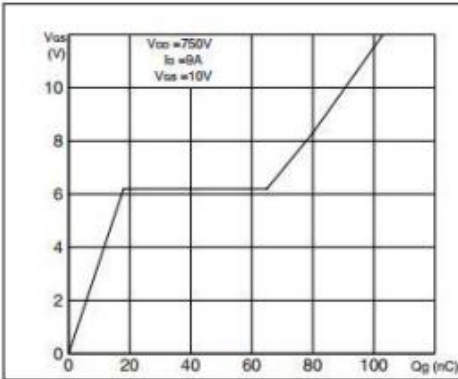


Figure 8. Capacitance variations

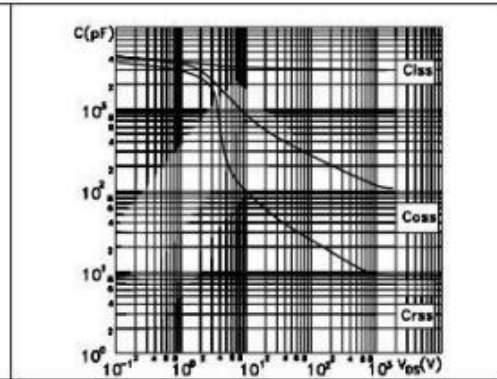


Figure 9. Normalized gate threshold voltage vs temperature

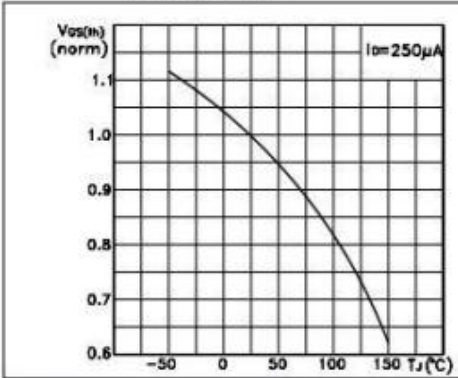


Figure 10. Normalized on resistance vs temperature

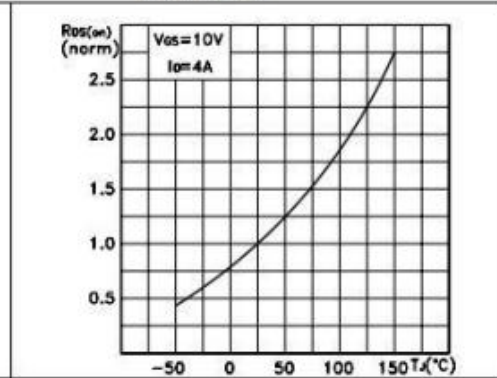
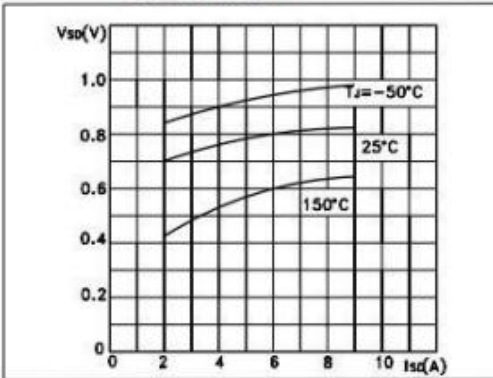


Figure 11. Source-drain diode forward characteristics





Typical Characteristics(Cont.)

Figure 7. Gate charge vs gate-source voltage

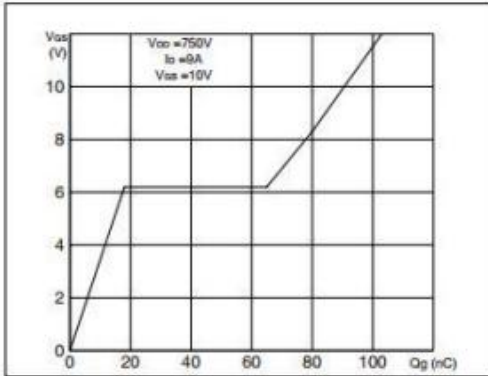


Figure 8. Capacitance variations

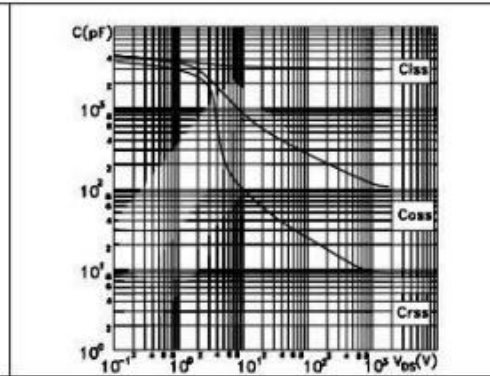


Figure 9. Normalized gate threshold voltage vs temperature

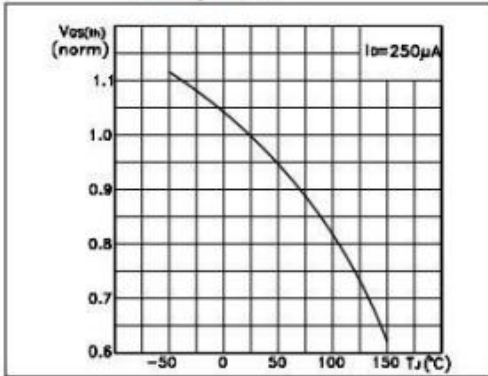


Figure 10. Normalized on resistance vs temperature

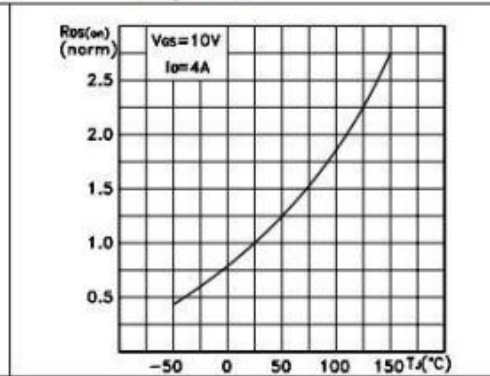
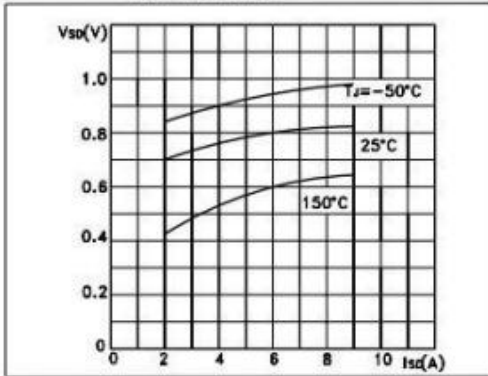


Figure 11. Source-drain diode forward characteristics





Test Circuits and Waveforms

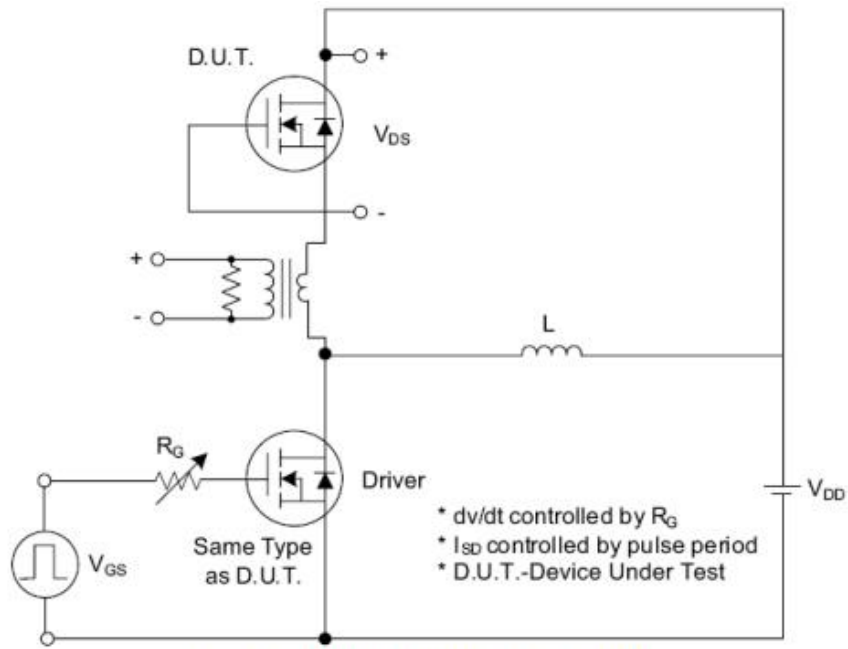


Fig. 1.1 Peak Diode Recovery dv/dt Test Circuit

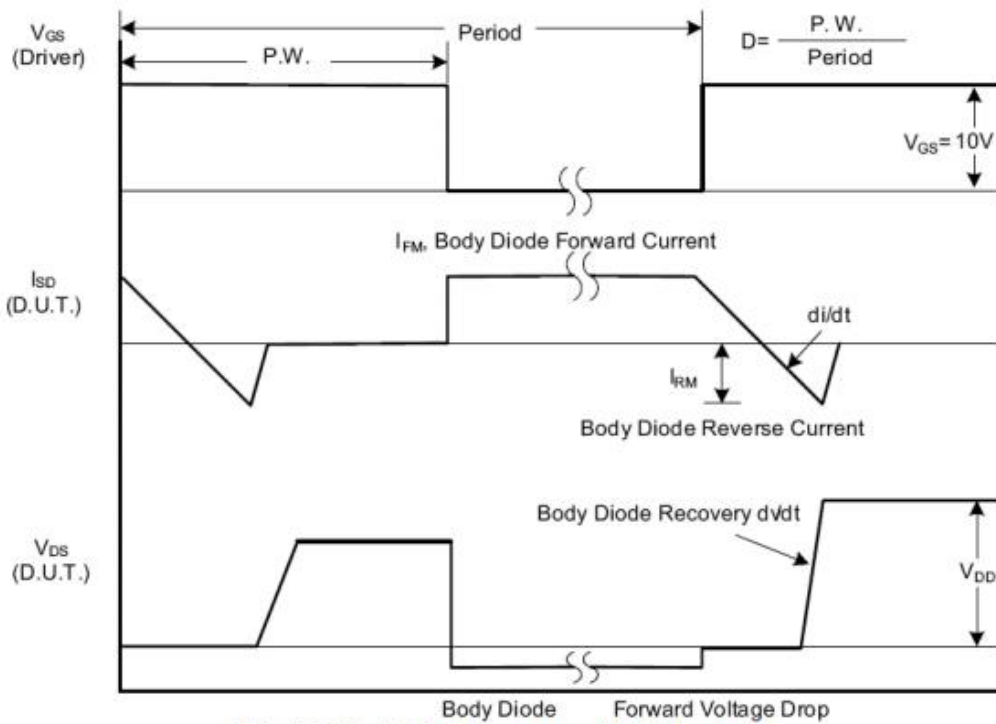


Fig. 1.2 Peak Diode Recovery dv/dt Waveforms



Test Circuits and Waveforms (Cont.)

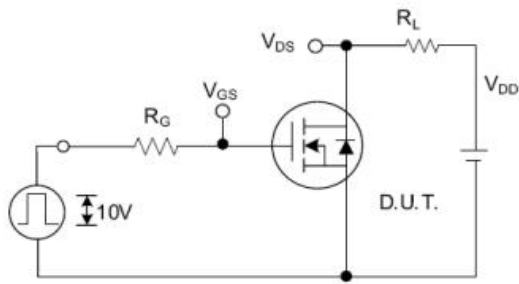


Fig. 2.1 Switching Test Circuit

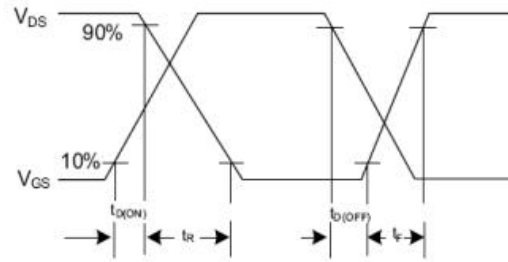


Fig. 2.2 Switching Waveforms

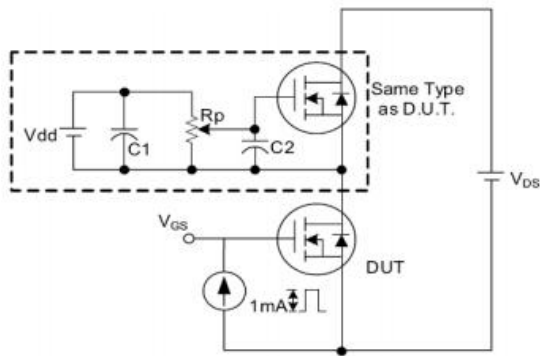


Fig. 3.1 Gate Charge Test Circuit

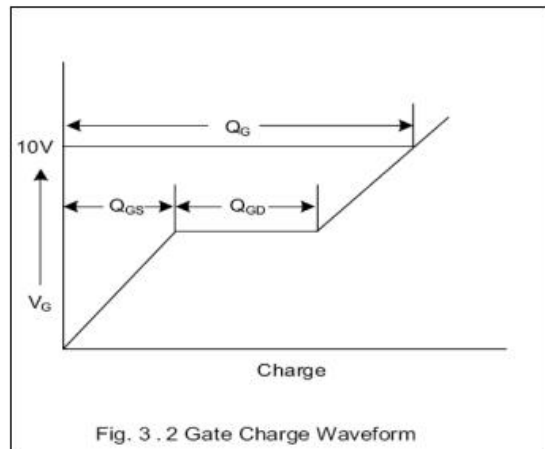


Fig. 3.2 Gate Charge Waveform

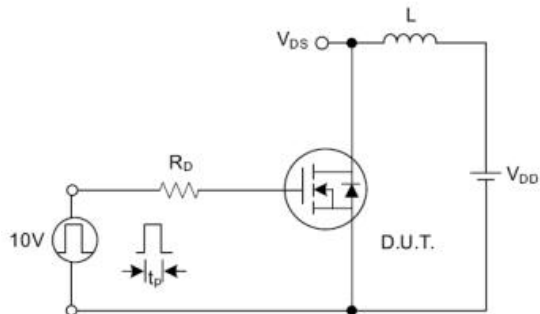


Fig. 4.1 Unclamped Inductive Switching Test Circuit

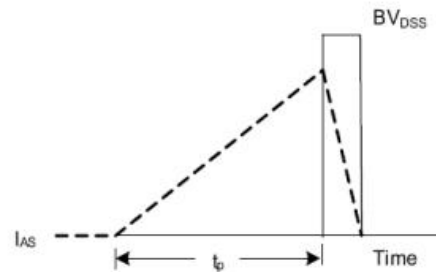


Fig. 4.2 Unclamped Inductive Switching Waveforms