IXTH12N45, IXTH12N50, IXTM12N45, IXTM12N50

12 AMPS, 450-500 V, 0.4Ω/0.5Ω

T-39-15

MAXIMUM RATINGS

Parameter	Sym.	IXTH12N45 IXTM12N45	IXTH12N50 IXTM12N50	Unit
Drain-Source Voltage (1)	V_{DSS}	450	500	V_{dc}
Drain-Gate Voltage (R_{GS}=1.0 MΩ) (1)	V_{DGR}	450	500	V_{dc}
Gate-Source Voltage Continuous	V_{GS}	±20		V_{dc}
Gate-Source Voltage Transient	V_{GSM}	±30		V
Drain Current Continuous (T_C=25°C)	I_D	12		A_{dc}
Drain Current Pulsed (3)	I_{DM}	48		A
Total Power Dissipation	P_D IXTH/IXTM	180/150		W
Power Dissipation Derating >25°C	IXTH/IXTM	1.4/1.2		W/°C
Operating and Storage Temperature	T_J & T_{stg}	−65 to +150		°C
Max. Lead Temp. for Soldering	T_L	300 (1.6mm from case for 10 sec.)		°C

ELECTRICAL CHARACTERISTICS T_C=25°C unless otherwise specified

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	12N45, 45A	450	–	–	V	V_{GS}=0V
		12N50, 50A	500	–	–	V	I_D=250μA
$V_{GS(th)}$	Gate Threshold Voltage	ALL	2.0	–	4.0	V	V_{DS}=V_{GS}, I_D=250μA
I_{GSS}	Gate-Source Leakage Forward	ALL	–	–	100	nA	V_{GS}=20V
I_{GSS}	Gate-Source Leakage Reverse	ALL	–	–	100	nA	V_{GS}=−20V
I_{DSS}	Zero Gate Voltage Drain Current	ALL	–	–	200	μA	V_{DS}=Max. Ratingx0.8, V_{GS}=0V
			–	–	1000	μA	V_{DS}=Max. Ratingx0.8, V_{GS}=0V, T_C=125°C
$R_{DS(on)}$	Static Drain-Source On-State Resistance (2)	12N45, 50A	–	–	0.4	Ω	V_{GS}=10V, I_D=6.0A
		12N45, 50	–	–	0.5	Ω	
G_{fs}	Forward Transconductance (2)	ALL	7.5	9.0	–	S	V_{DS}≥15V, I_D=6.0A
C_{iss}	Input Capacitance	ALL	–	2700	–	pF	V_{GS}=0V, V_{DS}=25V, f=1.0 MHz
C_{oss}	Output Capacitance	ALL	–	290	–	pF	
C_{rss}	Reverse Transfer Capacitance	ALL	–	80	–	pF	
$t_{d(on)}$	Turn-On Delay Time	ALL	–	20	35	ns	V_{DS}=0.5 BV_{DSS}, I_D=6.0A, Z_o=5Ω
t_r	Rise Time	ALL	–	25	50	ns	(MOSFET switching times are essentially independent of operating temperature. See Fig. 3, page 22 for test circuit.)
$t_{d(off)}$	Turn-Off Delay Time	ALL	–	70	100	ns	
t_f	Fall Time	ALL	–	30	60	ns	
Q_g	Total Gate Charge	ALL	–	–	120	nC	V_{GS}=10V, I_D=12.0A, V_{DS}=0.8 Max. Rating. (Gate charge is essentially independent of operating temperature. See Fig. 4, page 22 for test circuit.)
Q_{gs}	Gate-Source Charge	ALL	–	–	40	nC	
Q_{gd}	Gate-Drain ("Miller") Charge	ALL	–	–	60	nC	
W_{DSR}	Unclamped Drain-to-Source Avalanche Energy	12N45R, 45AR	800	–	–	mJ	See Fig. 5, page 22 for test circuit.
		12N50R, 50AR					

THERMAL RESISTANCE

R_{thJC}	Junction-to-Case	IXTM	–	–	0.83	°C/W	
		IXTH	–	–	0.7	°C/W	
R_{thJA}	Junction-to-Ambient TO-204	IXTM	–	–	30.0	°C/W	Free Air Operation
R_{thJA}	Junction-to-Ambient TO-247	IXTH	–	–	60.0	°C/W	Free Air Operation

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

I_S	Continuous Source Current (Body Diode)	ALL	–	–	12.0	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier.
I_{SM}	Pulse Source Current (Body Diode) (1)	ALL	–	–	48.0	A	
V_{SD}	Diode Forward Voltage (2)	ALL	–	–	1.5	V	T_C=25°C, I_f=12.0A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	ALL	–	400	–	ns	I_f=12.0A, di/dt=100A/μs

(1) T_J=25°C to 150°C

(2) Pulse test: Pulse width ≤300μs, duty cycle ≤2%

(3) Repetitive rating: Pulse width limited by max. junction temperature.

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