

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 ($R_{GS}=1.0\ M\Omega$) (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 ($T_C=25^\circ C$)	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 $>25^\circ C$	IXTH/IXTM	1.4/1.2		W/ $^\circ C$
Operating and Storage Temperature	T_J & T_{stg}	-65 to +150		$^\circ C$
Max. Lead Temp. for Soldering	T_L	300 (1.6mm from case for 10 sec.)		$^\circ C$

ELECTRICAL CHARACTERISTICS $T_C=25^\circ C$ unless otherwise specified

Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS} Drain-Source Breakdown Voltage	12N45, 45A	450	-	-	V	$V_{GS}=0V$ $I_D=250\mu A$
	12N50, 50A	500	-	-	V	
$V_{GS(th)}$ Gate Threshold Voltage	ALL	2.0	-	4.0	V	$V_{DS}=V_{GS}$, $I_D=250\mu A$
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	$V_{DS}=\text{Max. Rating} \times 0.8$, $V_{GS}=0V$
		-	-	1000	μA	$V_{DS}=\text{Max. Rating} \times 0.8$, $V_{GS}=0V$, $T_C=125^\circ C$
$R_{DS(on)}$ 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	$V_{DS} \geq 15V$, $I_D=6.0A$
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_{riss} Reverse Transfer Capacitance	ALL	-	80	-	pF	
$t_{d(on)}$ Turn-On Delay Time	ALL	-	20	35	ns	$V_{DS}=0.5\ BV_{DSS}$, $I_D=6.0A$, $Z_o=5\ \Omega$ (MOSFET switching times are essentially independent of operating temperature. See Fig. 3, page 22 for test circuit.)
t_r Rise Time	ALL	-	25	50	ns	
$t_{d(off)}$ Turn-Off Delay Time	ALL	-	70	100	ns	
t_f Fall Time	ALL	-	30	60	ns	
Q_g Total Gate Charge	ALL	-	-	120	nC	
Q_{gs} Gate-Source Charge	ALL	-	-	40	nC	$V_{GS}=10V$, $I_D=12.0A$, $V_{DS}=0.8\ \text{Max. Rating}$. (Gate charge is essentially independent of operating temperature. See Fig. 4, page 22 for test circuit.)
Q_{gd} Gate-Drain ("Miller") Charge	ALL	-	-	60	nC	
W_{DSR} Unclamped Drain-to-Source Avalanche Energy	12N45R, 45AR 12N50R, 50AR	800	-	-	mJ	See Fig. 5, page 22 for test circuit.

THERMAL RESISTANCE

Parameter	Type	IXTM	IXTH	Max.	Units	Test Conditions
R_{thJC} Junction-to-Case		-	-	0.83	$^\circ C/W$	
		-	-	0.7	$^\circ C/W$	
R_{thJA} Junction-to-Ambient TO-204	IXTM	-	-	30.0	$^\circ C/W$	Free Air Operation
R_{thJA} Junction-to-Ambient TO-247	IXTH	-	-	60.0	$^\circ C/W$	Free Air Operation

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
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	$T_C=25^\circ C$, $I_f=12.0A$, $V_{GS}=0V$
t_{rr} Reverse Recovery Time	ALL	-	400	-	ns	$I_f=12.0A$, $di/dt=100A/\mu s$

(1) $T_C=25^\circ C$ to $150^\circ C$

(2) Pulse test: Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$

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

