

**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 ( $R_{GS}=1.0\text{ M}\Omega$ ) (1)	$V_{DGR}$	450	500	$V_{dc}$
Gate-Source Voltage Continuous	$V_{GS}$		$\pm 20$	$V_{dc}$
Gate-Source Voltage Transient	$V_{GSM}$		$\pm 30$	V
Drain Current Continuous ( $T_C=25^\circ\text{C}$ )	$I_D$		12	$A_{dc}$
Drain Current Pulsed (3)	$I_{DM}$		48	A
Total Power Dissipation	$P_D$ IXTH/IXTM		180/150	W
Power Dissipation Derating $>25^\circ\text{C}$	IXTH/IXTM		1.4/1.2	W/ $^\circ\text{C}$
Operating and Storage Temperature	$T_J$ & $T_{stg}$		-65 to +150	$^\circ\text{C}$
Max. Lead Temp. for Soldering	$T_L$		300 (1.6mm from case for 10 sec.)	$^\circ\text{C}$

**ELECTRICAL CHARACTERISTICS**  $T_C=25^\circ\text{C}$  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	$I_D=250\mu\text{A}$
$V_{GS(th)}$ Gate Threshold Voltage	ALL	2.0	-	4.0	V	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$
$I_{GSS}$ 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	$\mu\text{A}$	$V_{DS}=\text{Max. Rating} \times 0.8, V_{GS}=0V$
		-	-	1000	$\mu\text{A}$	$V_{DS}=\text{Max. Rating} \times 0.8, V_{GS}=0V, T_C=125^\circ\text{C}$
$R_{DS(on)}$ Static Drain-Source On-State Resistance (2)	12N45, 50A	-	-	0.4	$\Omega$	$V_{GS}=10V, I_D=6.0A$
	12N45, 50	-	-	0.5	$\Omega$	
$G_{fs}$ Forward Transconductance (2)	ALL	7.5	9.0	-	S	$V_{DS} \geq 15V, I_D=6.0A$
$C_{iss}$ Input Capacitance	ALL	-	2700	-	pF	$V_{GS}=0V, V_{DS}=25V, f=1.0\text{ MHz}$
$C_{oss}$ Output Capacitance	ALL	-	290	-	pF	
$C_{riss}$ Reverse Transfer Capacitance	ALL	-	80	-	pF	
$t_{d(on)}$ Turn-On Delay Time	ALL	-	20	35	ns	$V_{DS}=0.5 BV_{DSS}, I_D=6.0A, Z_o=5\Omega$
$t_r$ 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	$V_{GS}=10V, I_D=12.0A, V_{DS}=0.8\text{ Max. Rating.}$ (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**

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

**SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS**

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

(1)  $T_J=25^\circ\text{C}$  to  $150^\circ\text{C}$

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

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