

FQH44N10_F133

N-Channel QFET® MOSFET

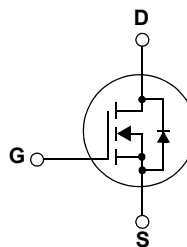
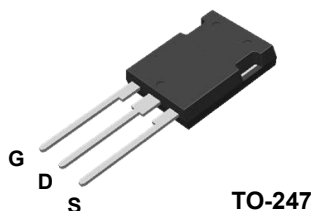
100 V, 48 A, 39 mΩ

Description

This N-Channel enhancement mode power MOSFET is produced using Fairchild Semiconductor®'s proprietary planar stripe and DMOS technology. This advanced MOSFET technology has been especially tailored to reduce on-state resistance, and to provide superior switching performance and high avalanche energy strength. These devices are suitable for switched mode power supplies, audio amplifier, DC motor control, and variable switching power applications.

Features

- 48 A, 100 V, $R_{DS(on)} = 39 \text{ m}\Omega$ (Max.) @ $V_{GS} = 10 \text{ V}$, $I_D = 24 \text{ A}$
- Low Gate Charge (Typ. 48 nC)
- Low C_{rss} (Typ. 85 pF)
- 100% Avalanche Tested
- 175°C Maximum Junction Temperature Rating



Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter		FQH44N10_F133	Unit
V _{DSS}	Drain-Source Voltage		100	V
I _D	Drain Current	- Continuous (T _C = 25°C)	48	A
		- Continuous (T _C = 100°C)	34	A
I _{DM}	Drain Current	- Pulsed (Note 1)	192	A
V _{GSS}	Gate-Source Voltage		± 25	V
E _{AS}	Single Pulsed Avalanche Energy (Note 2)		530	mJ
I _{AR}	Avalanche Current (Note 1)		48	A
E _{AR}	Repetitive Avalanche Energy (Note 1)		18	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)		6.0	V/ns
P _D	Power Dissipation (T _C = 25°C)		180	W
		- Derate above 25°C	1.2	W/°C
T _J , T _{STG}	Operating and Storage Temperature Range		-55 to +175	°C
T _L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		300	°C

Thermal Characteristics

Symbol	Parameter	FQH44N10_F133	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	0.83	$^\circ\text{C/W}$
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink, Typ.	0.24	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Max.	40	$^\circ\text{C/W}$

Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	100	--	--	V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 250 μA, Referenced to 25°C	--	0.1	--	V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 100 V, V _{GS} = 0 V	--	--	1	μA
		V _{DS} = 80 V, T _C = 150°C	--	--	10	μA
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 25 V, V _{DS} = 0 V	--	--	100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = -25 V, V _{DS} = 0 V	--	--	-100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250 μA	2.0	--	4.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 24 A	--	0.03	0.039	Ω
g _{FS}	Forward Transconductance	V _{DS} = 40 V, I _D = 24 A	--	31	--	S
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1.0 MHz	--	1400	1800	pF
C _{oss}	Output Capacitance		--	425	550	pF
C _{rss}	Reverse Transfer Capacitance		--	85	110	pF
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} = 50 V, I _D = 43.5 A, R _G = 25 Ω (Note 4)	--	19	45	ns
t _r	Turn-On Rise Time		--	190	390	ns
t _{d(off)}	Turn-Off Delay Time		--	90	190	ns
t _f	Turn-Off Fall Time		--	100	210	ns
Q _g	Total Gate Charge	V _{DS} = 80 V, I _D = 43.5 A, V _{GS} = 10 V (Note 4)	--	48	62	nC
Q _{gs}	Gate-Source Charge		--	9.0	--	nC
Q _{gd}	Gate-Drain Charge		--	24	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain-Source Diode Forward Current		--	--	48	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	192	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 48 A	--	--	1.5	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = 43.5 A,	--	98	--	ns
Q _{rr}	Reverse Recovery Charge	dI _F / dt = 100 A/μs	--	360	--	nC

Notes:

1. Repetitive Rating ; Pulse width limited by maximum junction temperature
2. $L = 0.345\text{ mH}$, $I_{AS} = 48\text{ A}$, $V_{DD} = 25\text{ V}$, $R_G = 25\text{ }\Omega$, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq 43.5\text{ A}$, $dI/dt \leq 300\text{ A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$
4. Essentially independent of operating temperature

Typical Characteristics

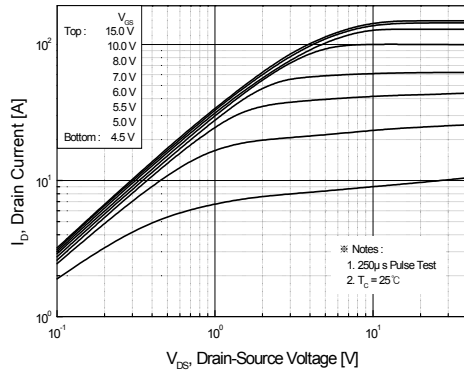


Figure 1. On-Region Characteristics

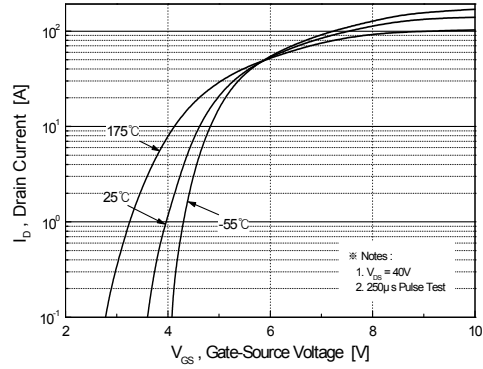


Figure 2. Transfer Characteristics

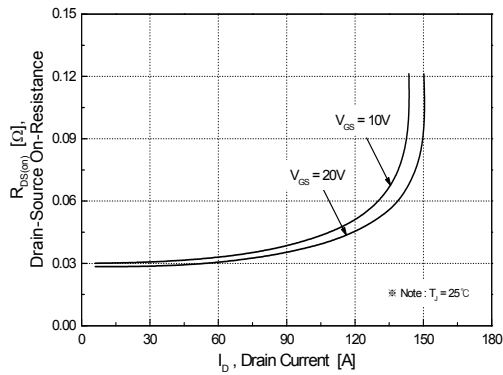


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

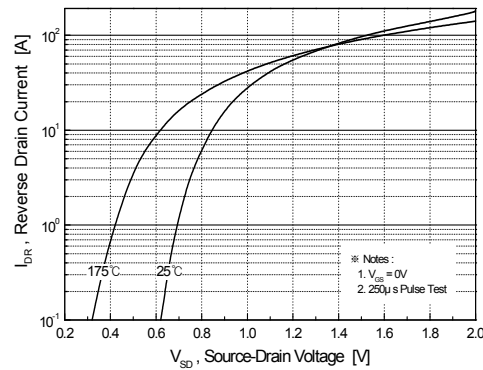


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

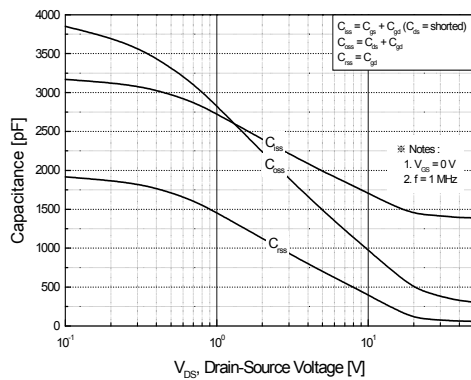


Figure 5. Capacitance Characteristics

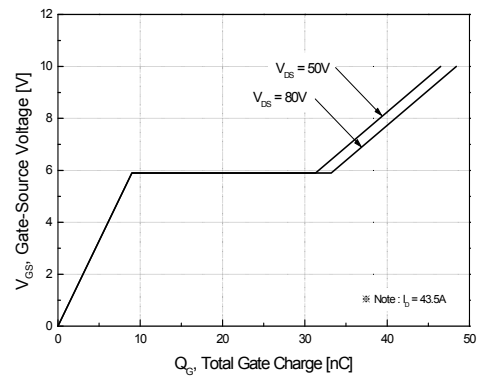


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

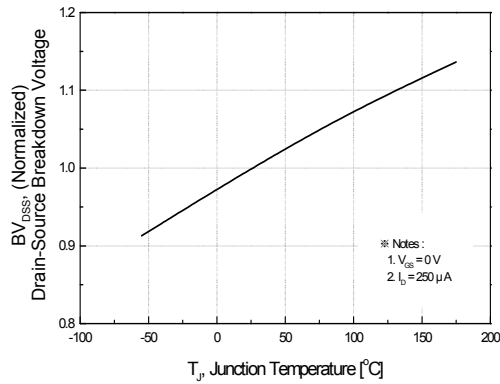


Figure 7. Breakdown Voltage Variation vs. Temperature

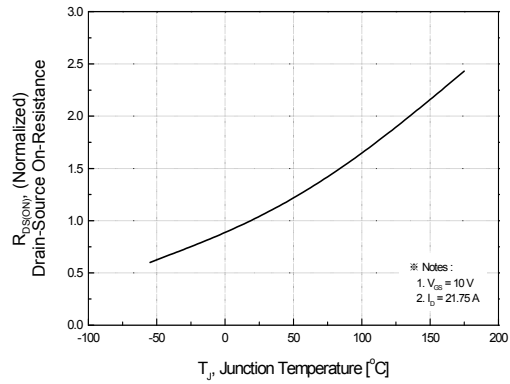


Figure 8. On-Resistance Variation vs. Temperature

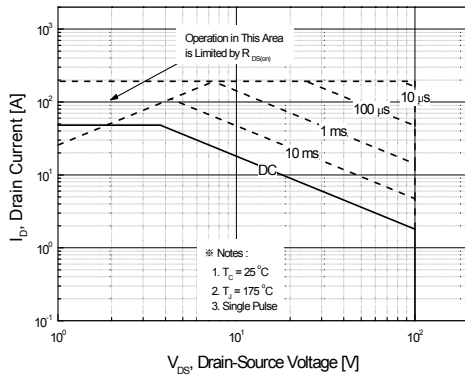


Figure 9. Maximum Safe Operating Area

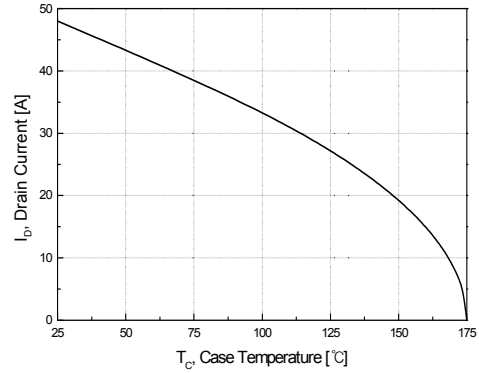


Figure 10. Maximum Drain Current vs. Case Temperature

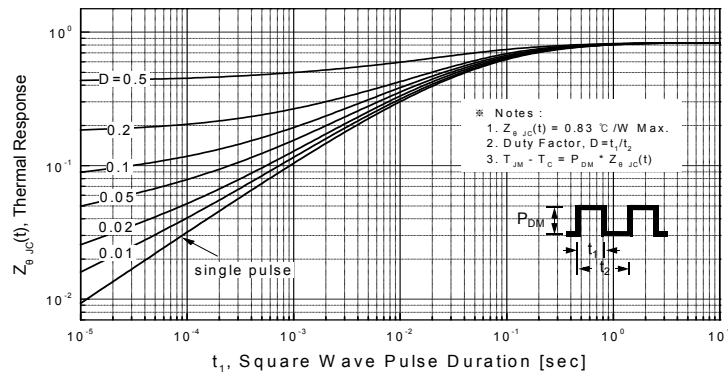
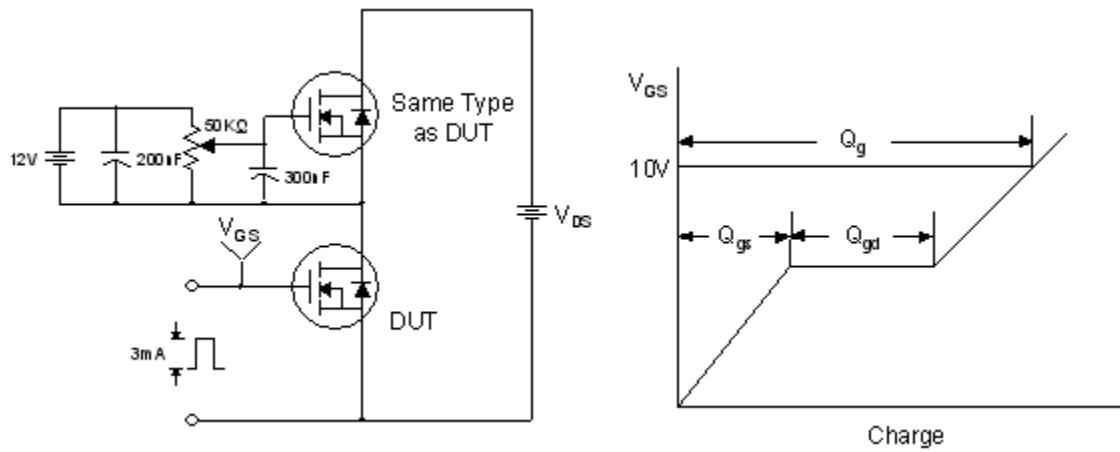
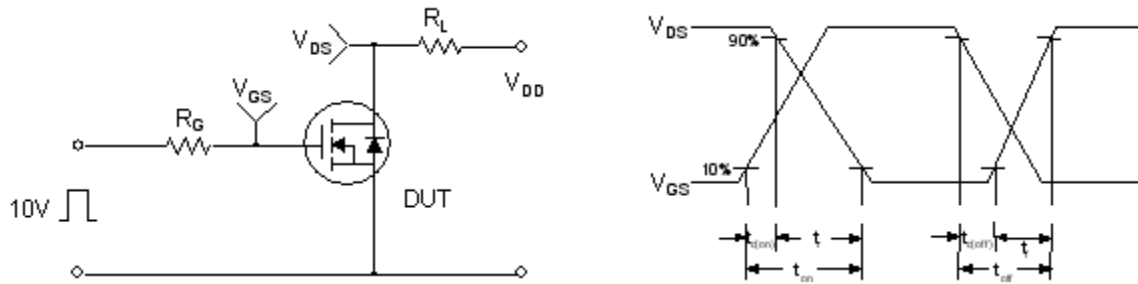


Figure 11. Transient Thermal Response Curve

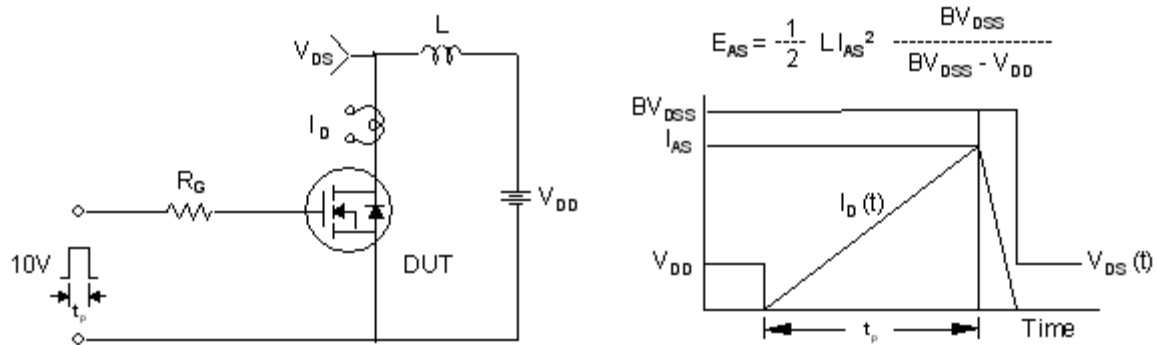
Gate Charge Test Circuit & Waveform



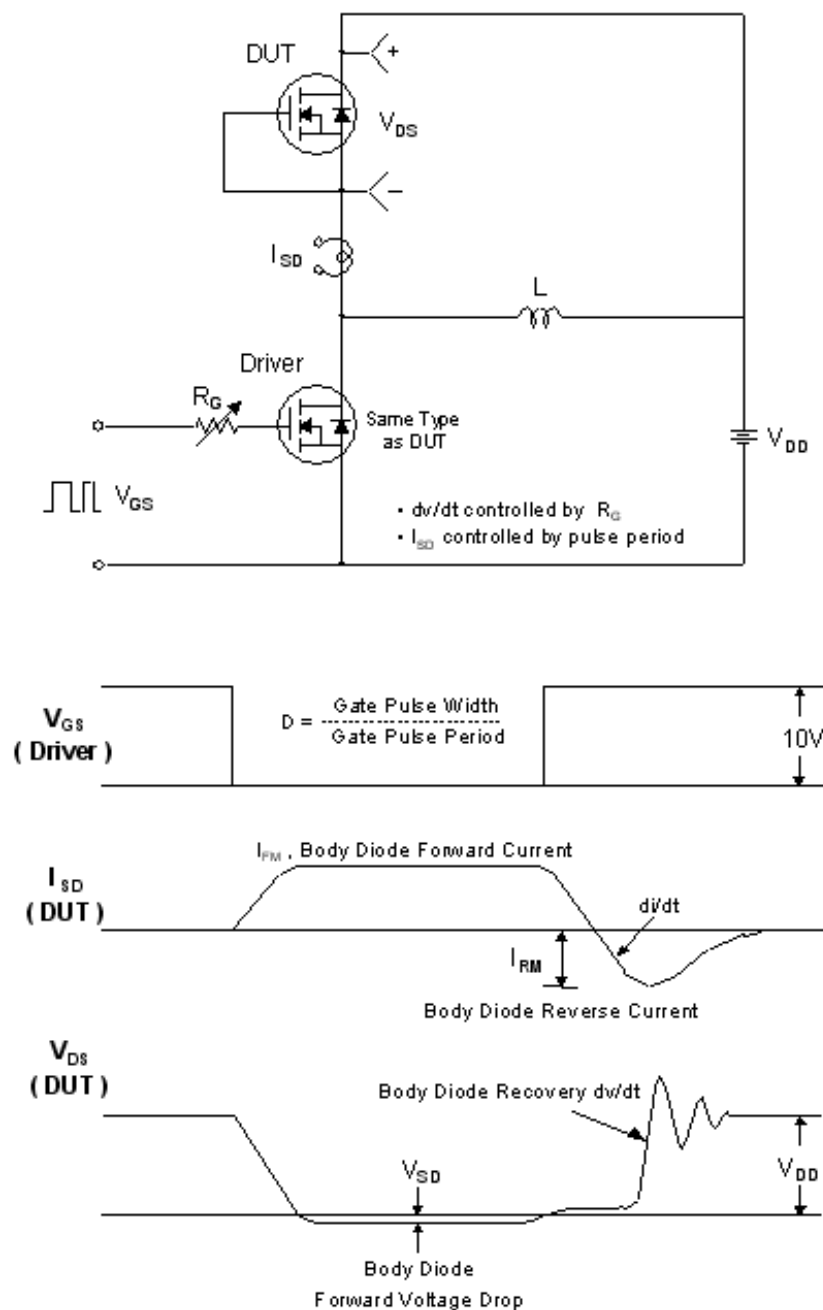
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

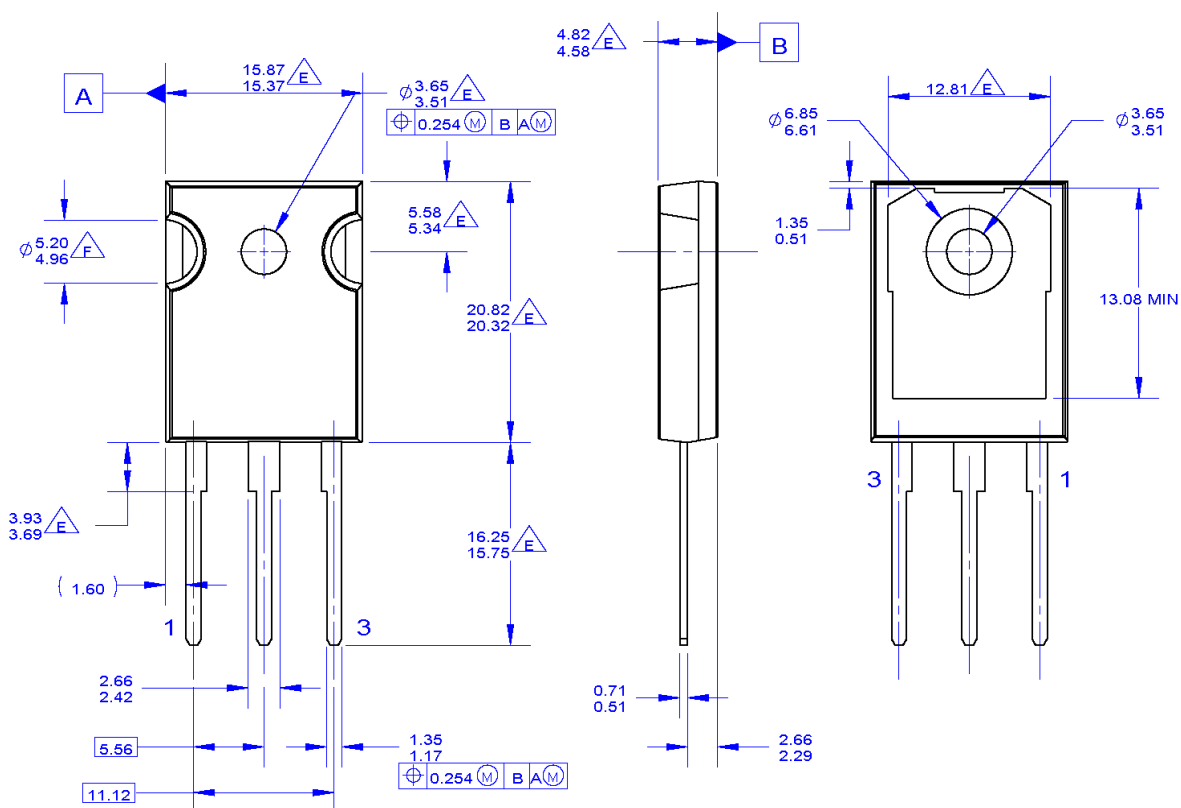


Peak Diode Recovery dv/dt Test Circuit & Waveforms



Mechanical Dimensions

TO-247A03



NOTES: UNLESS OTHERWISE SPECIFIED.

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- C. ALL DIMENSIONS ARE IN MILLIMETERS.
- D. DRAWING CONFORMS TO ASME Y14.5 - 1994

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G. DRAWING FILENAME: MKT-TO247A03_REV03

Dimensions in Millimeters

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