RoHS Compliant
HALOGEN-FREE

Yixin

MDD4N60/MDI4N60

N-Channel MOSFET 600V, 3.5A, 2.0Ω

General Description

These N-channel MOSFET are produced using advanced Technology, which provides low onstate resistance, high switching performance and excellent quality.

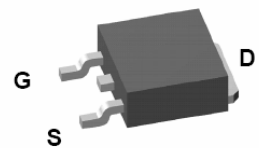
These devices are suitable device for SMPS, high Speed switching and general purpose applications.

Features

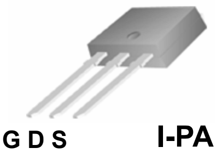
▫ V_{DS} = 600V	
▫ I_D = 3.5A	@ V_{GS} = 10V
▫ $R_{DS(ON)} \leq 2.0\Omega$	@ V_{GS} = 10V

Applications

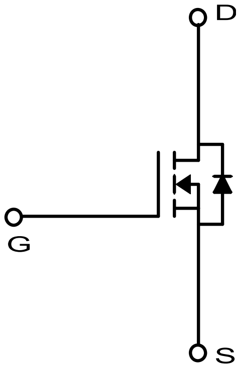
- Power Supply
- PFC
- High Current, High Speed Switching



D-PAK
(TO-252)



I-PAK
(TO-251)



Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	600	V
Gate-Source Voltage		V_{GSS}	±30	V
Continuous Drain Current	T_C=25°C	I_D	3.5	A
	T_C=100°C		2.2	A
Pulsed Drain Current(1)		I_{DM}	14	A
Power Dissipation	T_C=25°C	P_D	67.5	W
	Derate above 25 °C		0.54	W/ °C
Repetitive Avalanche Energy(1)		E_{AR}	6.75	mJ
Peak Diode Recovery dv/dt(3)		dv/dt	4.5	V/ns
Single Pulse Avalanche Energy(4)		E_{AS}	170	mJ
Junction and Storage Temperature Range		T_J, T_{stg}	-55~150	°C

* Id limited by maximum junction temperature

Thermal Characteristics

Characteristics	Symbol	MDD4N60 / MDI4N60	Unit
Thermal Resistance, Junction-to-Ambient(1)	$R_{\theta JA}$	110	°C/W
Thermal Resistance, Junction-to-Case(1)	$R_{\theta JC}$	1.85	

Ordering Information

Part Number	Temp. Range	Package	Packing	RoHS Status
MDD4N60RH	-55~150°C	D-pak	Reel	Halogen Free
MDI4N60TH	-55~150°C	I-pak	Tube	Halogen Free

Electrical Characteristics (Ta =25°C)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D = 250μA, V_{GS} = 0V	600	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	3.0	-	5.0	
Drain Cut-Off Current	I_{DSS}	V_{DS} = 600V, V_{GS} = 0V	-	-	1	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±30V, V_{DS} = 0V	-	-	100	nA
Drain-Source ON Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 1.75A		1.7	2.0	Ω
Forward Transconductance	g_{fs}	V_{DS} = 30V, I_D = 1.75A	-	4	-	S
Dynamic Characteristics						
Total Gate Charge	Q_g	V_{DS} = 480V, I_D = 4.0A, V_{GS} = 10V$^{(3)}$	-	12.1		nC
Gate-Source Charge	Q_{gs}		-	3.5		
Gate-Drain Charge	Q_{gd}		-	4.4		
Input Capacitance	C_{iss}	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz	-	506	660	pF
Reverse Transfer Capacitance	C_{rss}		-	2.3	3	
Output Capacitance	C_{oss}		-	58	75	
Turn-On Delay Time	$t_{d(on)}$	V_{GS} = 10V, V_{DS} = 300V, I_D = 4.0A, R_G = 25Ω$^{(3)}$	-	12		ns
Rise Time	t_r		-	20		
Turn-Off Delay Time	$t_{d(off)}$		-	27		
Fall Time	t_f		-	20		
Drain-Source Body Diode Characteristics						
Maximum Continuous Drain to Source Diode Forward Current	I_S		-	4.6	-	A
Source-Drain Diode Forward Voltage	V_{SD}	I_S = 4.0A, V_{GS} = 0V	-		1.4	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 4.0A, dI/dt = 100A/μs$^{(3)}$	-	243		ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	1.5		μC

Note :

1. Pulse width is based on $R_{\theta JC}$ & $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C.
2. Pulse test: pulse width ≤300us, duty cycle≤2%, pulse width limited by junction temperature $T_{J(MAX)}$=150°C.
3. I_{SD} ≤4.0A, di/dt≤200A/us, V_{DD}=50V, R_g =25Ω, Starting T_J=25°C
4. L=17.9mH, I_{AS}=4.0A, V_{DD}=50V, R_g =25Ω, Starting T_J=25°C,

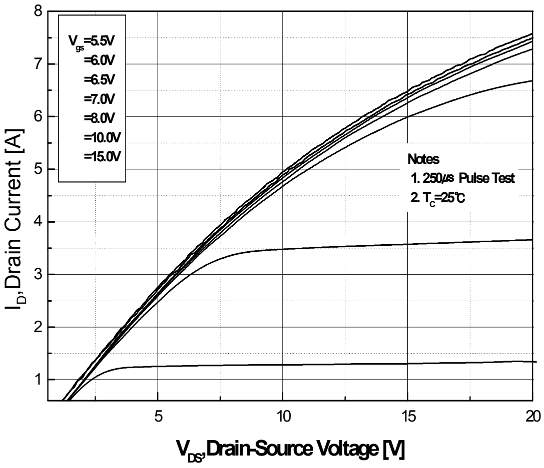


Fig.1 On-Region Characteristics

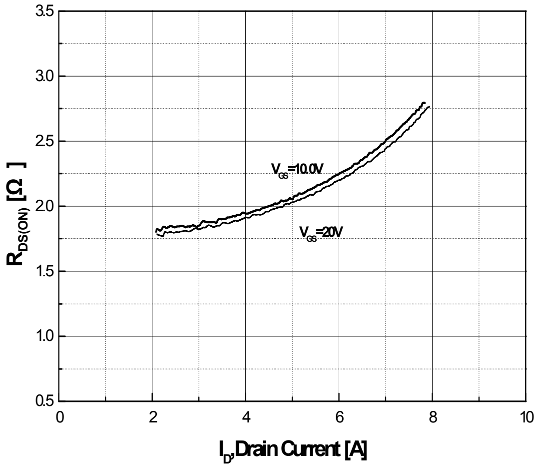


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

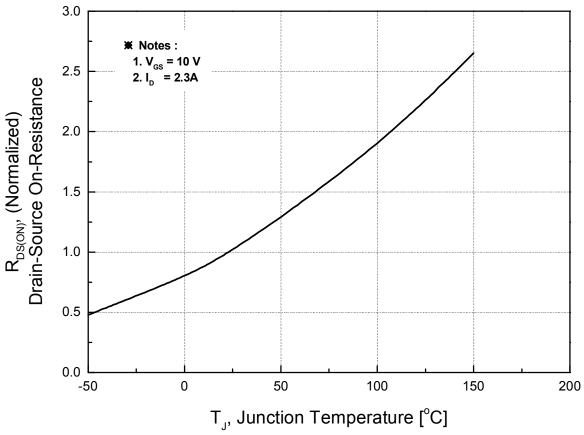


Fig.3 On-Resistance Variation with Temperature

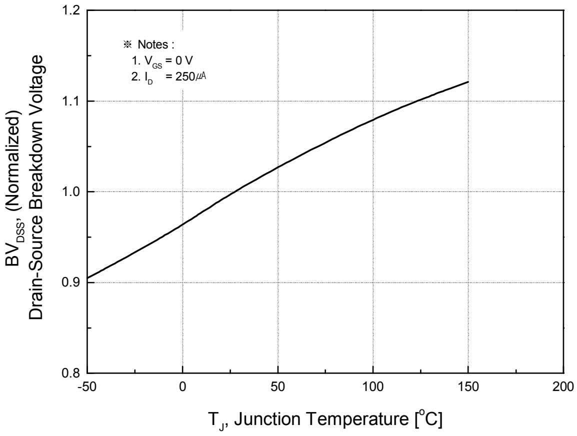


Fig.4 Breakdown Voltage Variation vs. Temperature

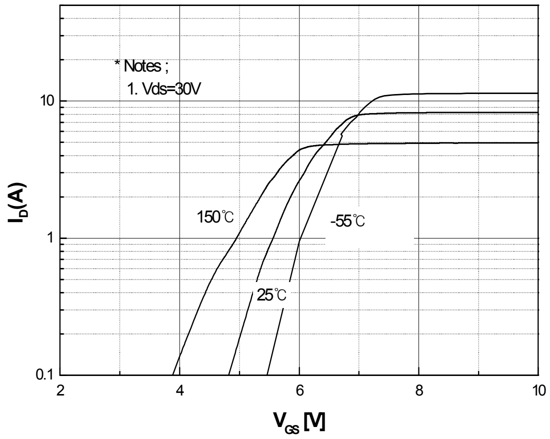


Fig.5 Transfer Characteristics

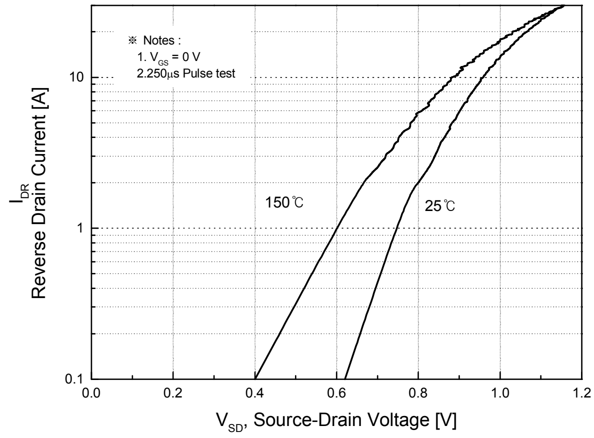


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

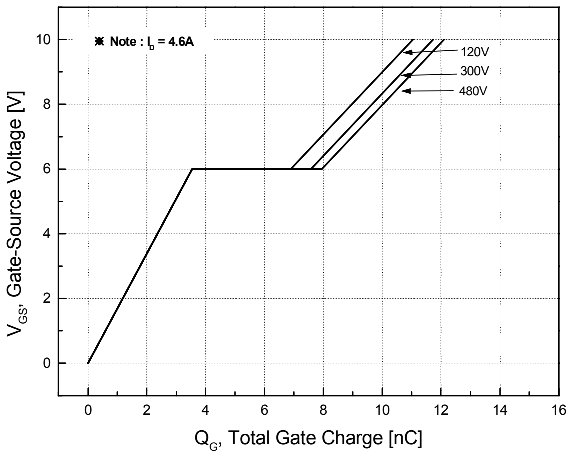


Fig.7 Gate Charge Characteristics

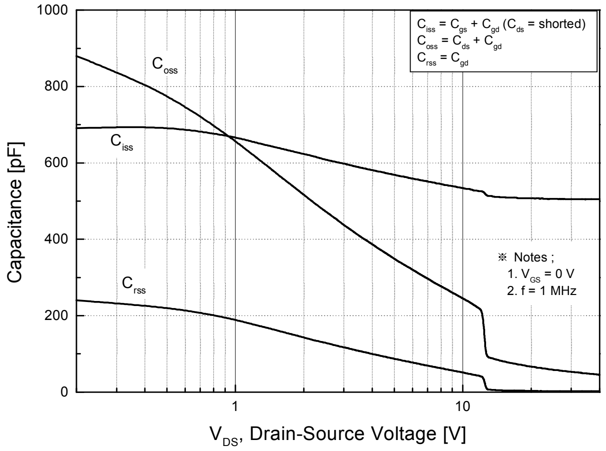


Fig.8 Capacitance Characteristics

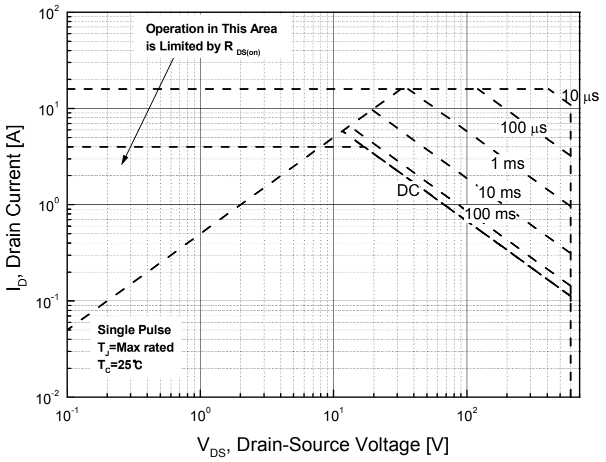


Fig.9 Maximum Safe Operating Area

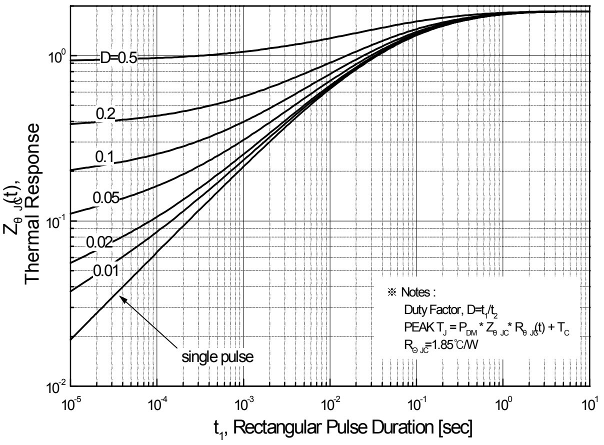


Fig.10 Transient Thermal Response Curve

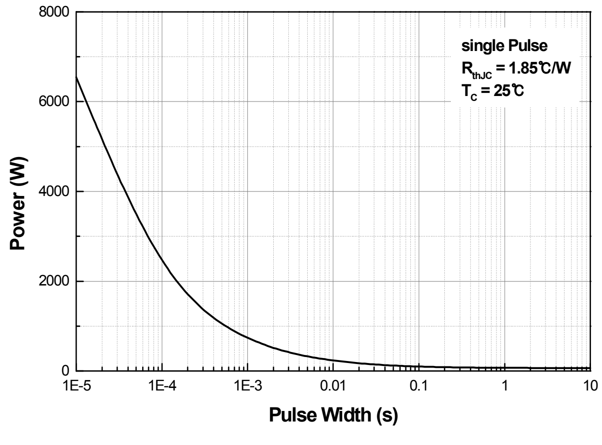


Fig.11 Single Pulse Maximum Power Dissipation

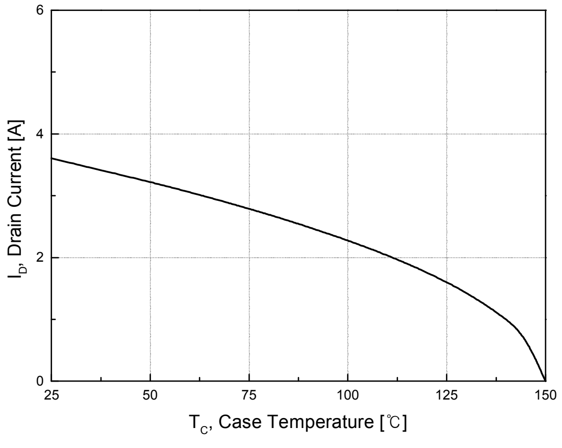
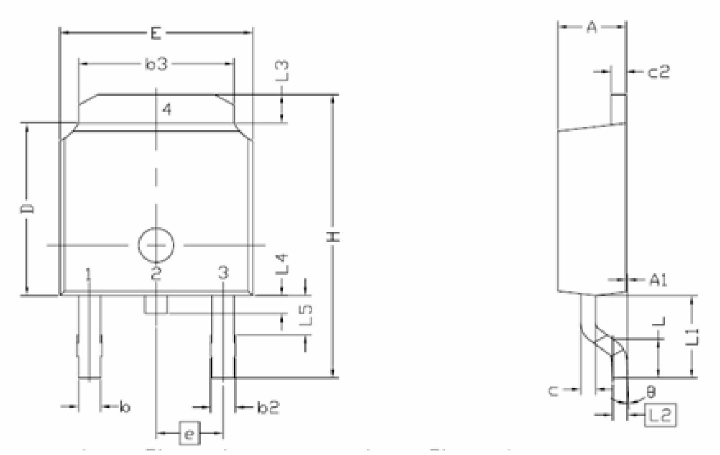


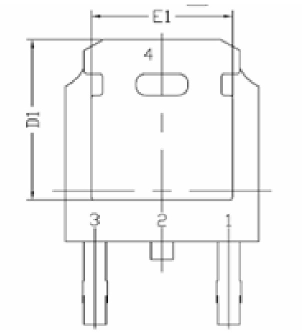
Fig.12 Maximum Drain Current vs. Case Temperature

Physical Dimension

TO-252 (DPAK)

Dimensions are in millimeters, unless otherwise specified



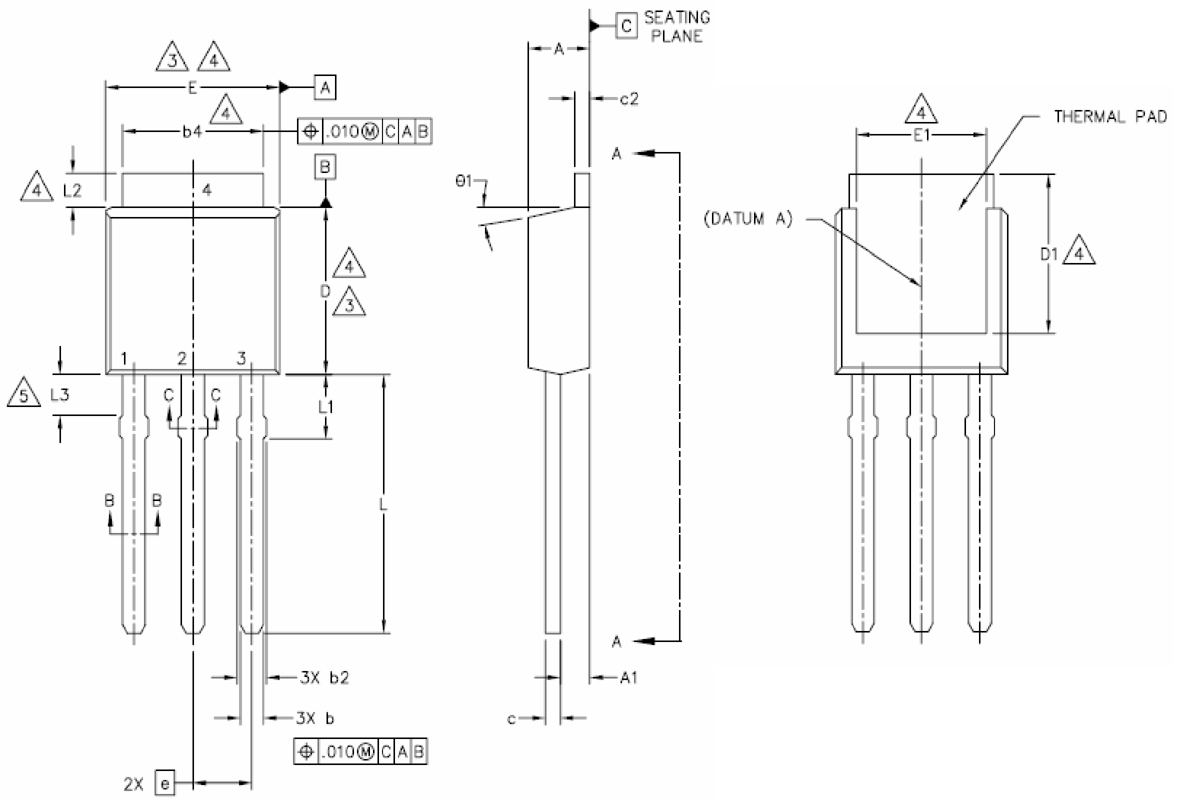


Symbol	Min.	Nom.	Max.
E	6.35	-	6.73
L	1.40	1.52	1.78
L1	2.74 REF		
L2	0.508 BCS		
L3	0.89	-	1.27
L4	-	-	1.02
L5	1.14	-	1.52
D	5.97	6.10	6.22
H	9.40	-	10.41
b	0.64	-	0.89
b2	0.76	-	1.14
b3	4.95	-	5.46
e	2.286 BSC		
A	2.18	-	2.39
A1	-	-	0.13
c	0.46	-	0.61
c2	0.46	-	0.89
D1	5.21	-	-
E1	4.32	-	-
Θ	0.00	-	10.00

Physical Dimension

TO251 (I-PAK)

Dimensions are in millimeters, unless otherwise specified



SYMBOL	MIN	NOM	MAX
A	2.18	-	2.39
A1	0.89	-	1.14
b	0.64	-	0.89
b1	0.64	0.71	0.79
b2	0.76	-	1.14
b4	4.95	-	5.46
c	0.46	-	0.61
c2	0.46	-	0.89
D	5.97	6.10	6.22
D1	4.75	-	
E	6.35	-	6.73
E1	4.32	-	0.00
e	2.30 BSC		
L	8.89	-	9.65
L1	1.80	-	2.29
L2	0.70	-	1.27
L3	1.14	-	1.52