

N-CHANNEL POWER MOSFET MEM1N60

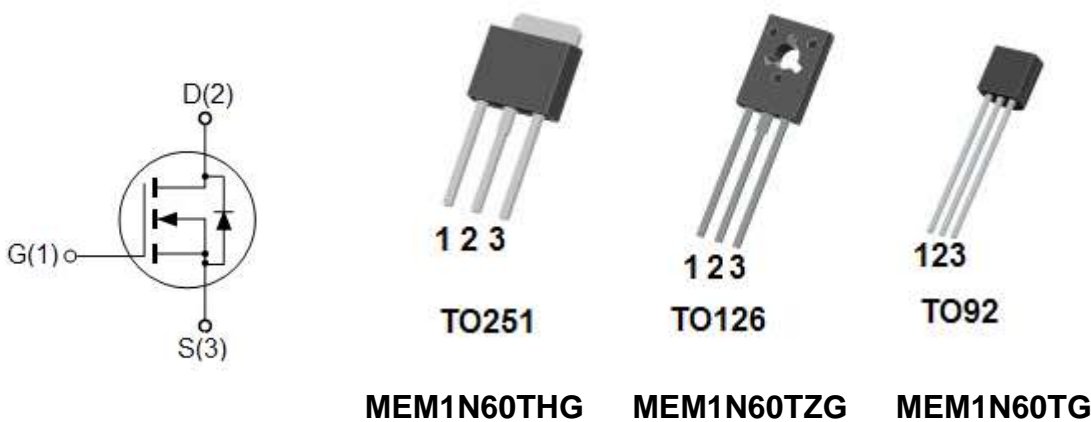
General Description

- Switching regulator application.
- High voltage and high speed.
- Switching application.

Features

- 600V, 1A
- $R_{DS(ON)}=9.3\Omega$ @ $V_{GS}=10V$
- LOW CRSS
- FAST SWITCHING
- PACKAGE : TO251, TO126, TO92

Pin Configuration



Maximum Ratings($T_A=25^\circ\text{C}$)

Parameter		Symbol	Ratings	Unit
Drain-Source Voltage		V_{DSS}	600V	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	$T_A=25^\circ\text{C}$	I_D	1	A
	$T_A=100^\circ\text{C}$		0.6	
Pulsed Drain Current ^{1,2}		I_{DM}	4	A
Total Power Dissipation	$T_A=25^\circ\text{C}$	P_d	36	W
Operating Temperature Range		T_{Opr}	-55-150	$^\circ\text{C}$
Storage Temperature Range		T_{stg}	-55-150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	TYP.	MAX.	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.0	3.5	$^\circ\text{C/W}$

Electrical Characteristics

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	600	650	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	3.15	4.0	V
Gate-Body Leakage	I_{GSS}	$V_{DS}=0V, V_{GS}=30V$	-	0.8	100	nA
		$V_{DS}=0V, V_{GS}=-30V$	-	-4	-100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=600V, V_{GS}=0V$	-	0.8	20	μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=1A$	-	7.2	9.3	Ω
Forward Transconductance	g_{FS}	$V_{DS}=15V, I_D=1A$	-	0.9	10	S
Drain-Source Diode Forward Continuous Current	I_S	$V_{GS}=0V$	-	-	1	A
Source-drain (diode forward) voltage	V_{SD}	$V_{GS}=0V, I_D=1A$		0.85	1.5	V
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=25V,$ $V_{GS}=0V,$ $f=1MHz$	-	196	-	pF
Output Capacitance	C_{oss}		-	50	-	
Reverse Transfer Capacitance	C_{rss}		-	15	-	
Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=300V,$ $R_G=4.7\Omega$ $V_{GS}=10V,$ $I_D=1A$	-	18	-	ns
Rise Time	t_r		-	7.5	-	
Turn-Off Delay Time	$t_{d(off)}$		-	27.5	-	
Fall-Time	t_f		-	20.6	-	
Total Gate Charge	Q_g	$V_{DS}=300V,$ $V_{GS}=10V,$ $I_D=1A$		4.4	-	nC
Gate-Source Charge	Q_{gs}		-	1.2	-	
Gate-Drain Charge	Q_{gd}		-	2	-	

- 1、Repetitive rating, pulse width limited by junction temperature.
- 2、Pulse width <300us , duty cycle <2%.
- 3、 $I_{SD}=1.0A, di/dt \leq 100A/\mu s, V_{DD} \leq BV_{DSS}, T_J \leq 150^\circ C$.
- 4、 $L=9mH, V_{DD}=50V, I_D=1.0A, R_G=25\Omega, Starting T_J=25^\circ C$.

Typical performance characteristics

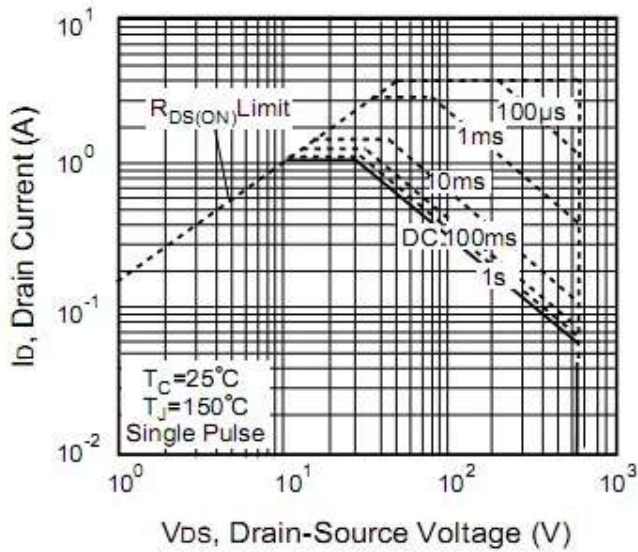


Figure 1. Maximum Safe Operating Area

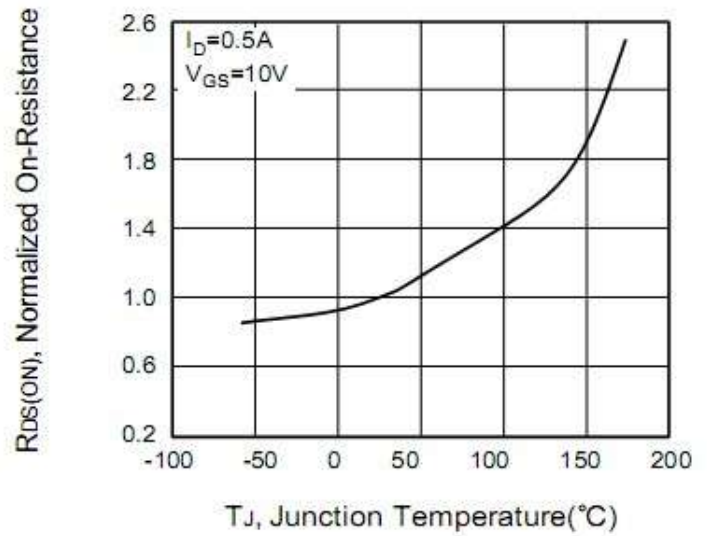


Figure 2. Normalized On-Resistance Variation with Temperature

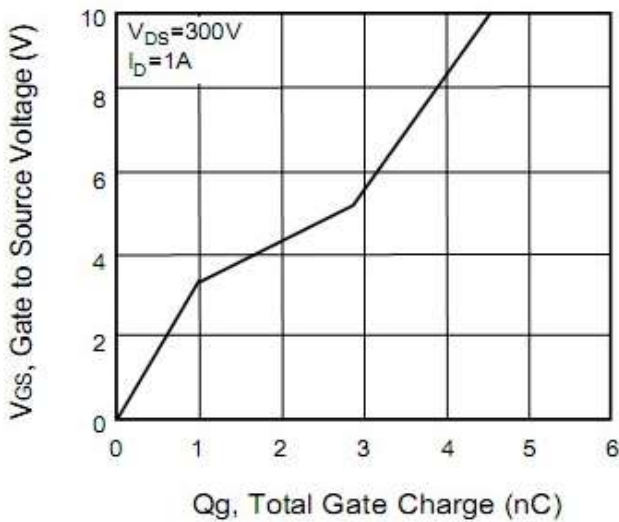


Figure 3. Gate Charge Characteristics

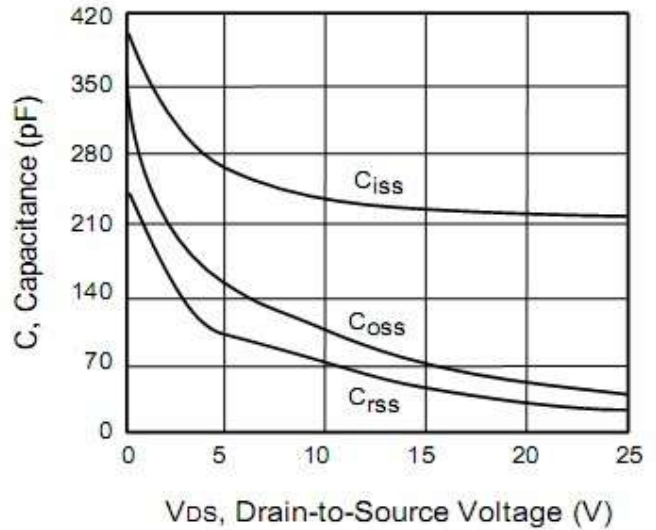


Figure 4. Capacitance Characteristics

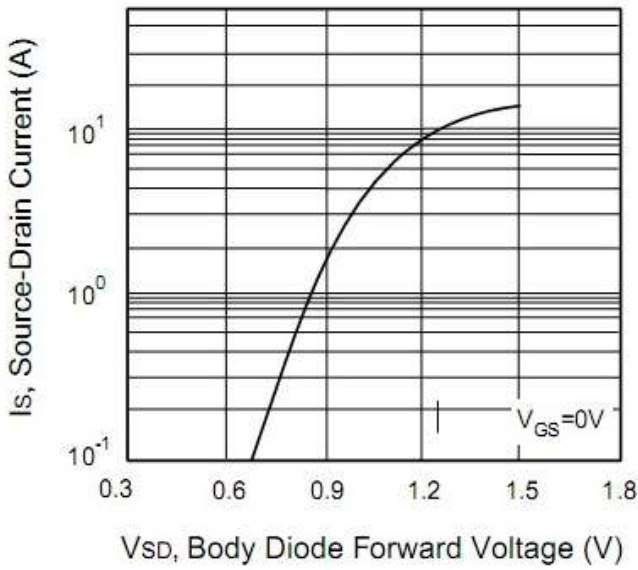


Figure 5. Body Diode Forward Voltage Variation with Source Current

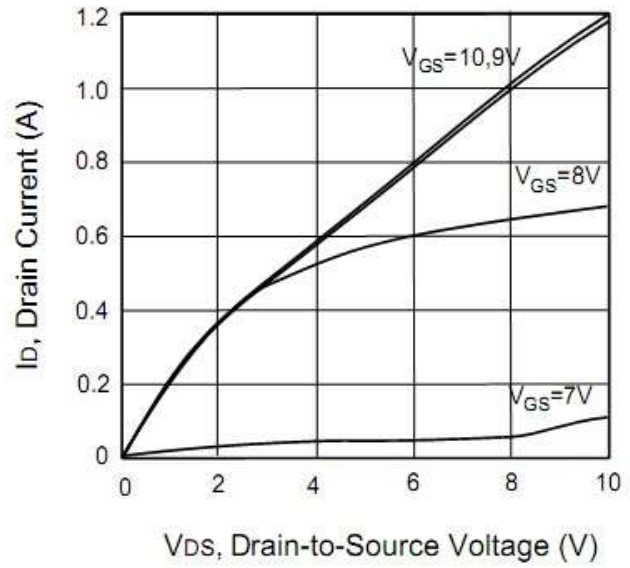


Figure 6. On-State Characteristics

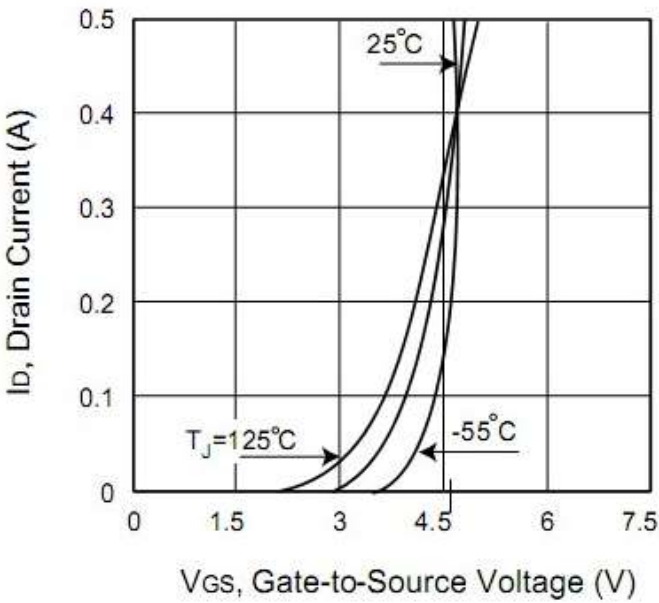


Figure 7. Transfer Characteristics

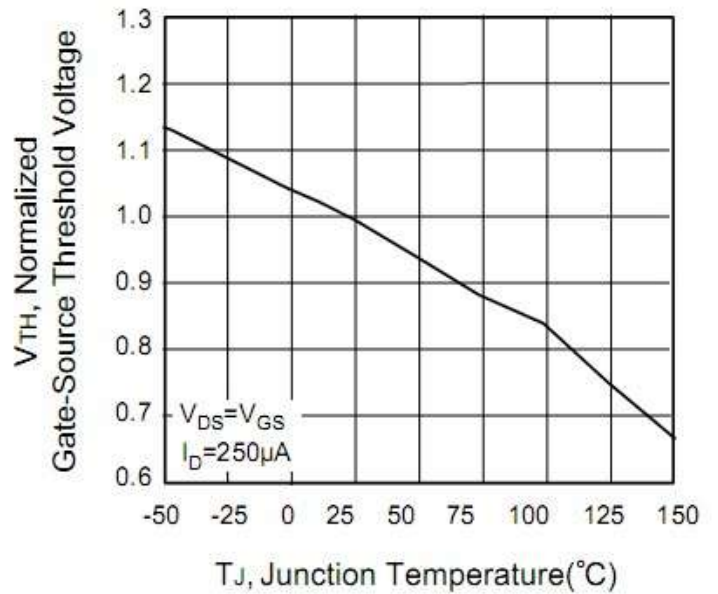


Figure 8. Gate Threshold Variation with Temperature

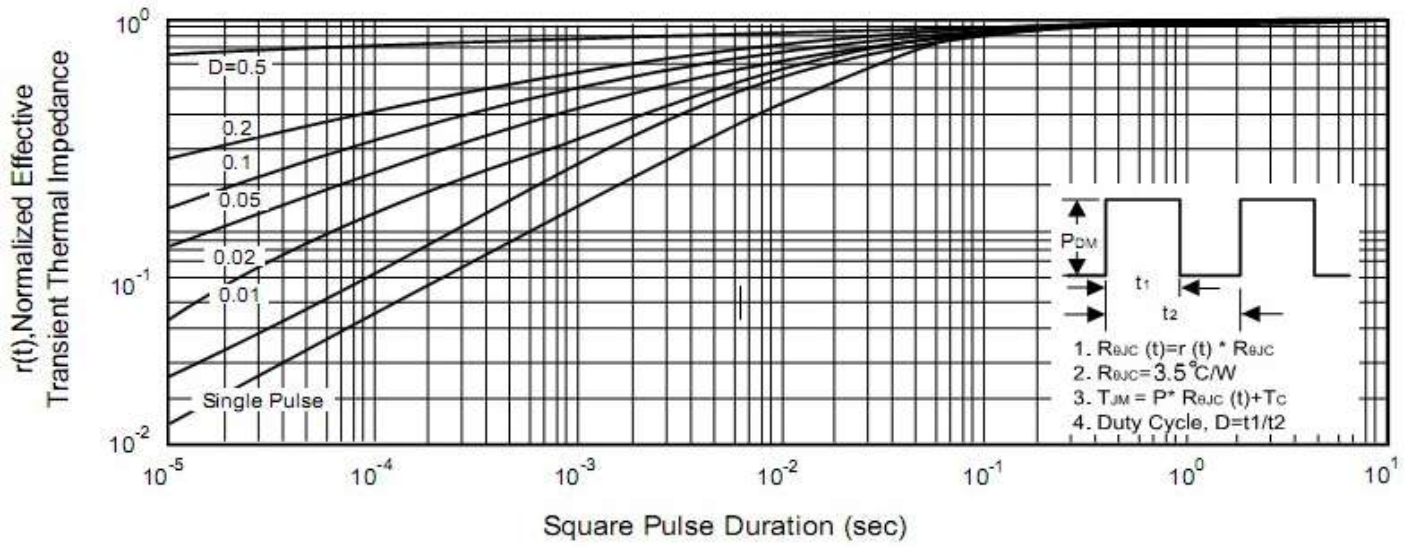
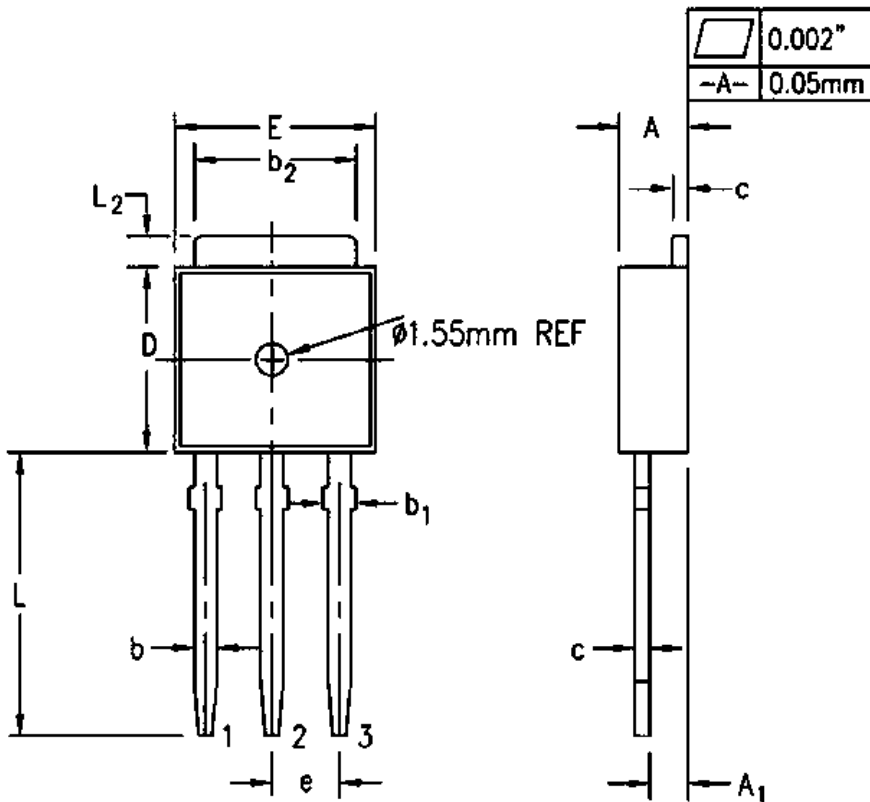


Figure 9. Normalized Effective Transient Thermal Impedance With Pulse Duration

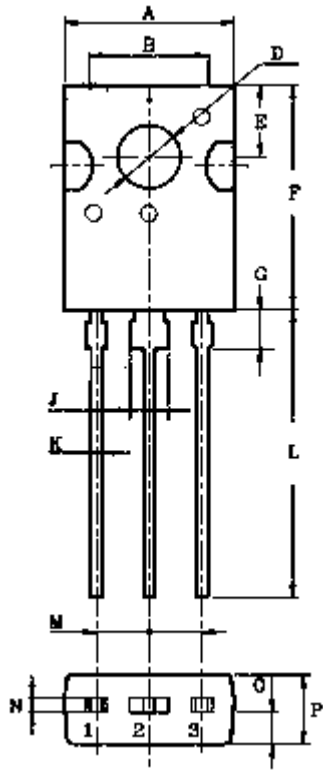
Package Information

Package Type: TO-251



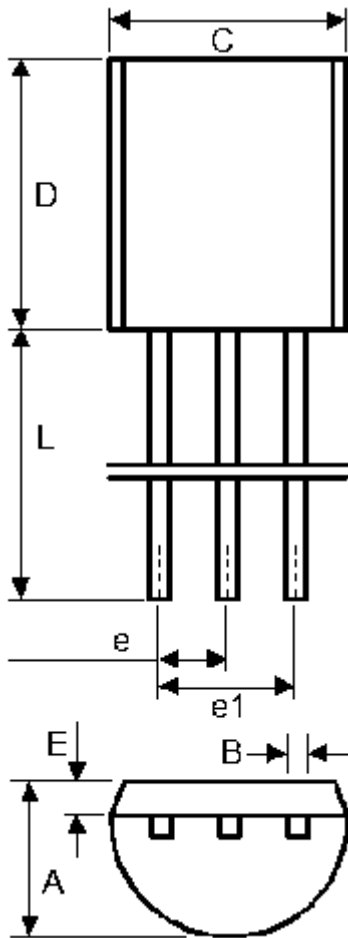
DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	2.19	2.38	0.086	0.094
A1	1.02	1.14	0.040	0.045
b	0.64	0.89	0.025	0.035
b1	0.84	1.14	0.033	0.045
b2	5.21	5.46	0.205	0.215
c	0.46	0.58	0.018	0.024
D	5.97	6.22	0.235	0.245
E	6.35	6.73	0.250	0.265
e	2.28REF		0.090REF	
L	8.89	9.65	0.350	0.380
L2	0.89	1.27	0.035	0.050

Package Type: TO-126



Symbol	Millimeters	
	Min.	Max.
A	7.75	7.85
B	4.95	5.05
D	Φ3.05	Φ3.15
E	3.85	4.15
F	10.75	10.85
G	2.45	2.55
J	1.28	1.32
K	0.95	1.05
L	15.65	15.95
M	2.236	2.336
N	0.6	0.9
O	1.15	1.25
P	2.75	2.85

Package Type:TO-92



Symbol	Millimeters	
	Min.	Max.
A	3.4	3.8
B	0.3	0.5
C	4.4	4.8
D	4.4	4.8
E	0.9	1.5
e	1.17	1.37
e1	2.39	2.69
L	12	16

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N-CHANNEL POWER MOSFET MEM2N60

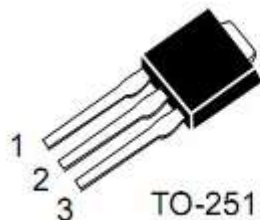
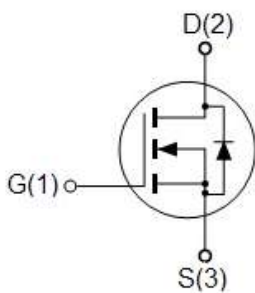
General Description

- Switching regulator application.
- High voltage and high speed.
- Switching application.

Features

- 600V, 2A
- $R_{DS(ON)}=4.5\Omega$ @ $V_{GS}=10V$
- LOW CR_{SS}
- FAST SWITCHING
- PACKAGE : TO251, TO252, TO-220F

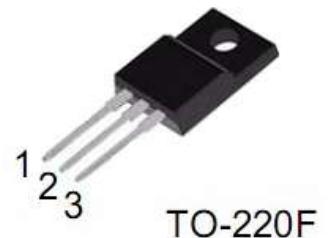
Pin Configuration



MEM2N60THG



MEM2N60K3G



MEM2N60A3G

Maximum Ratings($T_A=25^\circ\text{C}$)

Parameter		Symbol	Ratings	Unit
Drain-Source Voltage		V_{DSS}	600V	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	$T_A=25^\circ\text{C}$	I_D	2	A
	$T_A=100^\circ\text{C}$		1.2	
Pulsed Drain Current ^{1,2}		I_{DM}	8	A
Total Power Dissipation	$T_A=25^\circ\text{C}$	P_d	41	W
Operating Temperature Range		T_{Opr}	-55-150	$^\circ\text{C}$
Storage Temperature Range		T_{stg}	-55-150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	TYP.	MAX.	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.5	3	$^\circ\text{C/W}$

Electrical Characteristics

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	600	650	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5	3.5	4.0	V
Gate-Body Leakage	I_{GSS}	$V_{DS}=0V, V_{GS}=30V$	-	0.8	100	nA
		$V_{DS}=0V, V_{GS}=-30V$	-	-4	-100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=600V, V_{GS}=0V$	-	0.8	20	μA
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=1A$	-	3.8	4.5	Ω
Forward Transconductance	g_{FS}	$V_{DS}=15V, I_D=1A$	-	2	10	S
Drain-Source Diode Forward Continuous Current	I_S	$V_{GS}=0V$	-	-	2	A
Source-drain (diode forward) voltage	V_{SD}	$V_{GS}=0V, I_D=2A$		0.85	1.4	V
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=25V,$ $V_{GS}=0V,$ $f=1MHz$	-	347	-	pF
Output Capacitance	C_{oss}		-	61	-	
Reverse Transfer Capacitance	C_{rss}		-	16	-	
Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=300V,$ $R_G=10\Omega$ $V_{GS}=10V,$ $I_D=2A$	-	19.4	-	ns
Rise Time	t_r		-	7.74	-	
Turn-Off Delay Time	$t_{d(off)}$		-	28.7	-	
Fall-Time	t_f		-	9.3	-	
Total Gate Charge	Q_g	$V_{DS}=300V,$ $V_{GS}=10V,$ $I_D=2A$		7.84	-	nC
Gate-Source Charge	Q_{gs}		-	1.91	-	
Gate-Drain Charge	Q_{gd}		-	3	-	

- 1、Repetitive rating, pulse width limited by junction temperature.
- 2、Pulse width <300us , duty cycle <2%.
- 3、 $I_{SD}=2.0A, di/dt \leq 100A/\mu s, V_{DD} \leq BV_{DSS}, T_J \leq 150^\circ C$.
- 4、 $L=2.2mH, V_{DD}=50V, I_D=2.0A, R_G=25\Omega, Starting T_J=25^\circ C$.

Typical performance characteristics

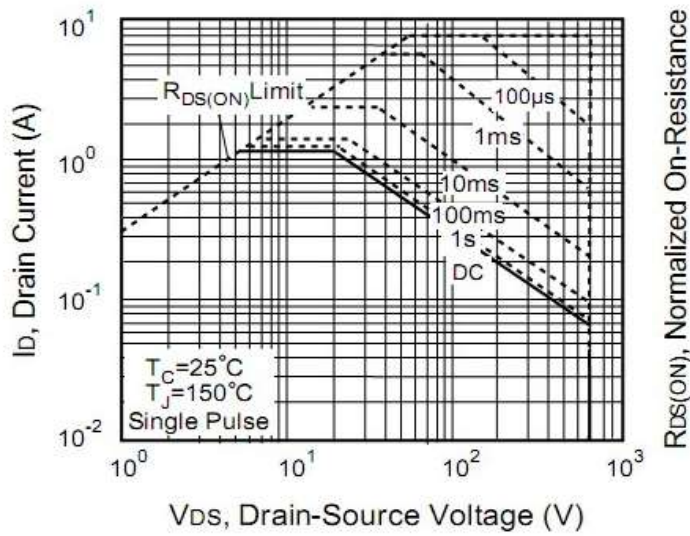


Figure 1 Maximum Safe Operating Area

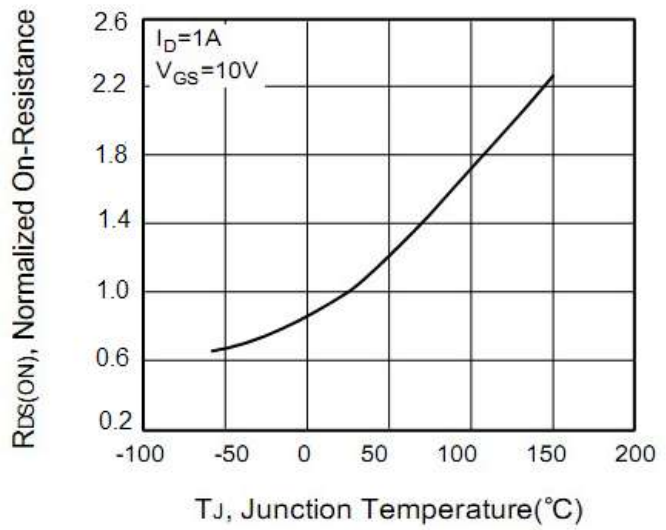


Figure 2. Normalized On-Resistance Variation with Temperature

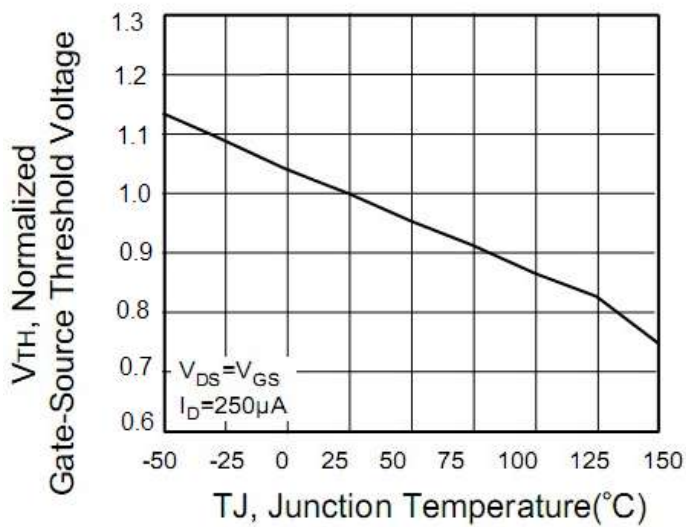


Figure 3. Gate Threshold Variation with Temperature

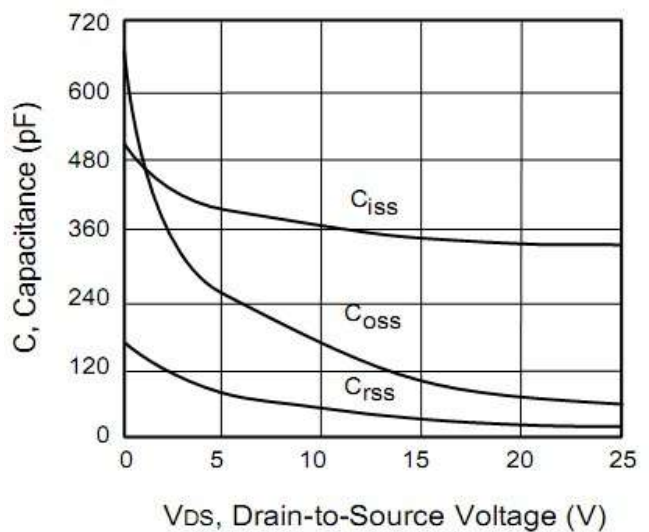


Figure 4. Capacitance Characteristics

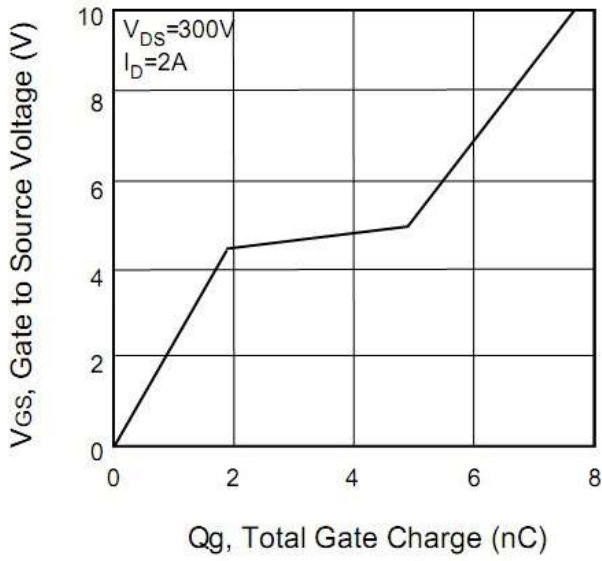


Figure 5. Gate Charge Characteristics

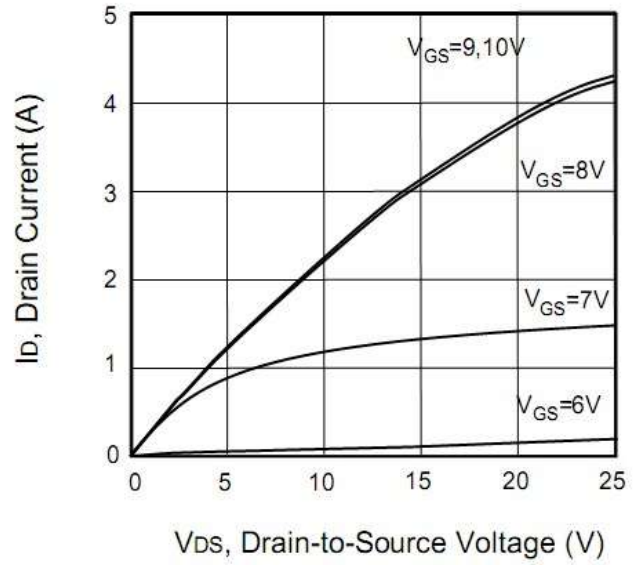


Figure 6. On-State Characteristics

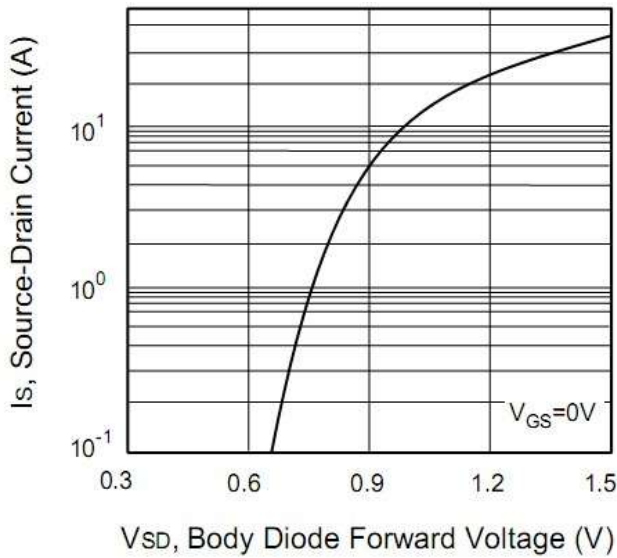


Figure 7. Body Diode Forward Voltage Variation with Source Current

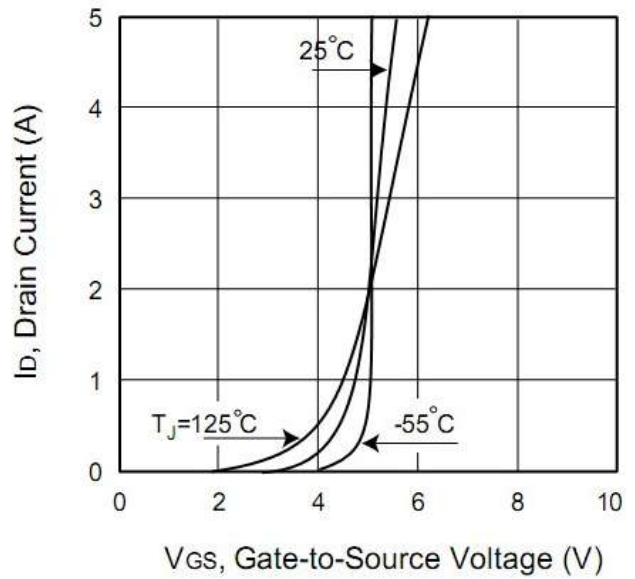


Figure 8. Transfer Characteristics

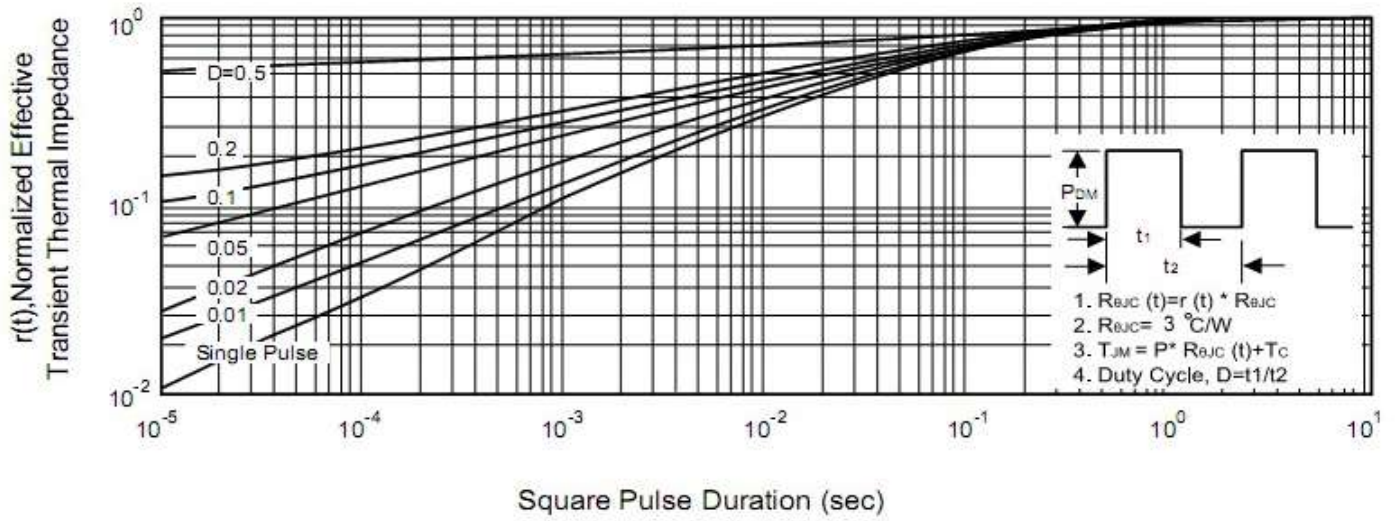
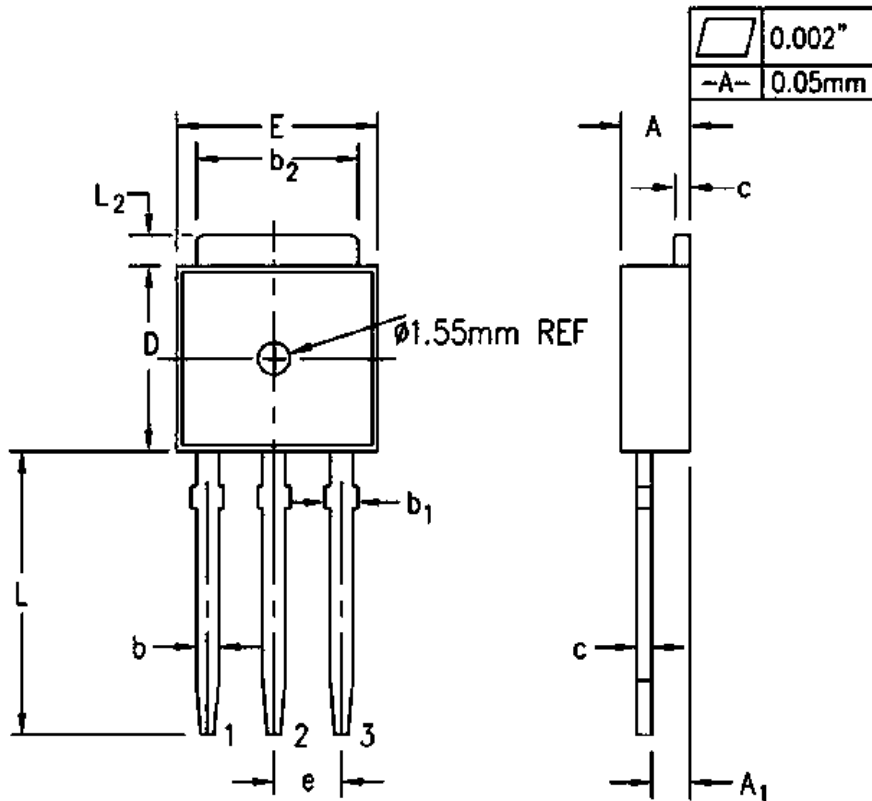


Figure 9 Normalized Effective Transient Thermal Impedance With Pulse Duration

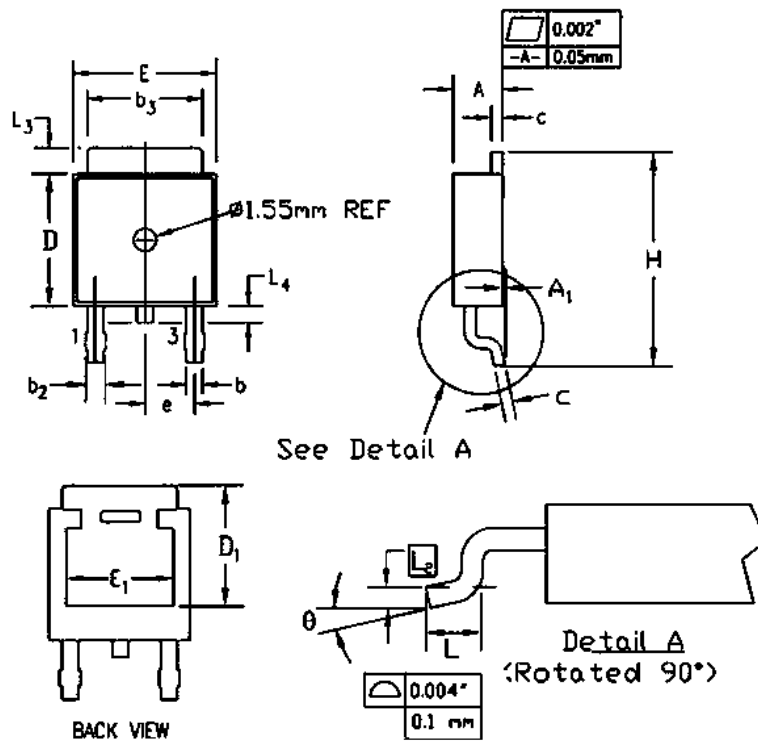
Package Information

Package Type: TO-251



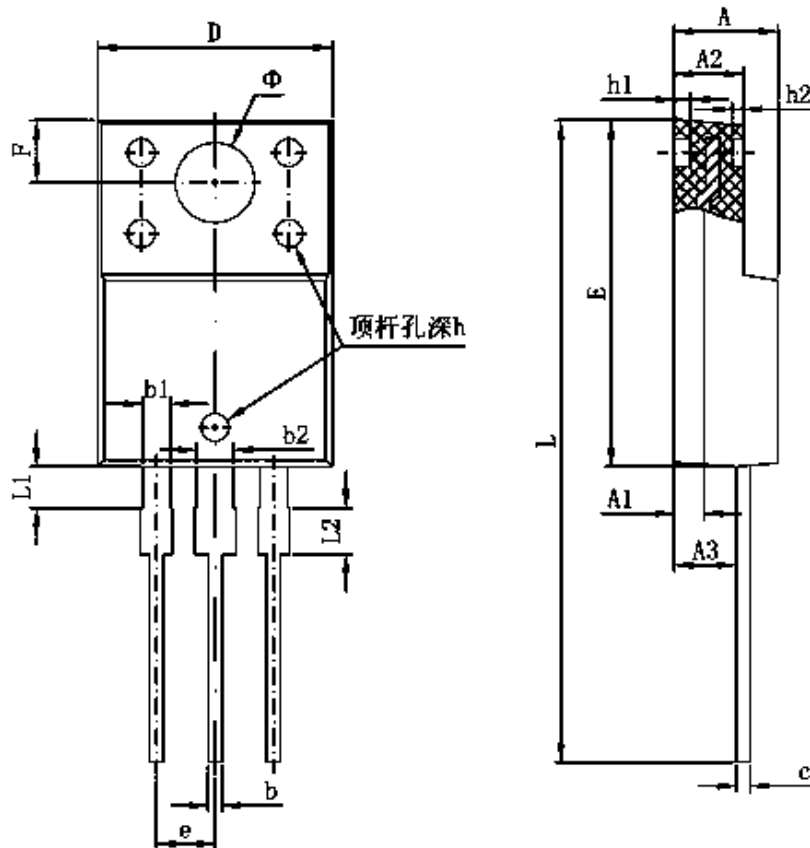
DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	2.19	2.38	0.086	0.094
A1	1.02	1.14	0.040	0.045
b	0.64	0.89	0.025	0.035
b1	0.84	1.14	0.033	0.045
b2	5.21	5.46	0.205	0.215
c	0.46	0.58	0.018	0.024
D	5.97	6.22	0.235	0.245
E	6.35	6.73	0.250	0.265
e	2.28REF		0.090REF	
L	8.89	9.65	0.350	0.380
L2	0.89	1.27	0.035	0.050

Package Type: TO-252



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	2.19	2.38	0.086	0.094
A1	-	0.13	-	0.005
b	0.64	0.89	0.025	0.035
b2	0.84	1.14	0.033	0.045
b3	5.21	5.46	0.205	0.215
c	0.46	0.61	0.018	0.024
D	5.97	6.22	0.235	0.250
D1	5.21	-	0.205	-
E	6.35	6.73	0.250	0.265
E1	4.83	-	0.190	-
e	2.29REF		0.090REF	
H	9.65	10.41	0.380	0.410
L	1.40	1.78	0.055	0.070
L2	0.51REF		0.020REF	
L3	0.89	1.27	0.035	0.050
L4	0.64	1.01	0.025	0.040
θ	0°	8°	0°	8°

Package Type: TO-220F



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	4.30	4.70	0.169	0.185
A1	1.30REF		0.051REF	
A2	2.80	3.20	0.110	0.126
A3	2.50	2.90	0.098	0.114
b	0.50	0.75	0.020	0.030
b1	1.10	1.35	0.043	0.053
b2	1.50	1.75	0.059	0.069
c	0.50	0.75	0.020	0.030
D	9.96	10.36	0.392	0.408
E	14.8	15.2	0.583	0.598
e	2.54REF		0.100REF	
F	2.70REF		0.106REF	
Φ	3.50REF		0.138REF	
h	0.00	0.30	0.00	0.012
h1	0.80REF		0.031REF	
h2	0.50REF		0.020REF	
L	28.0	28.4	1.102	1.118
L1	1.70	1.90	0.067	0.075
L2	1.90	2.10	0.075	0.083

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N-CHANNEL POWER MOSFET MEM4N60

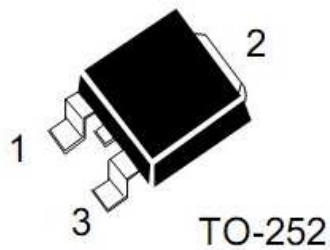
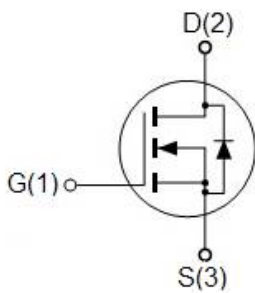
General Description

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- High voltage and high speed.
- Switching application.

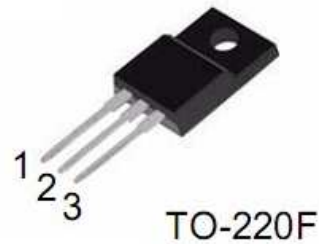
Features

- 600V, 4A
- $R_{DS(ON)}=2.3\ \Omega @V_{GS}=10V$
- LOW CRSS
- FAST SWITCHING
- PACKAGE : TO220F, TO252

Pin Configuration



MEM4N60K3G



MEM4N60A3G

Maximum Ratings($T_A=25^\circ\text{C}$)

Parameter		Symbol	Ratings		Unit
Drain-Source Voltage		V_{DSS}	600V		V
Gate-Source Voltage		V_{GSS}	± 30		V
Drain Current	$T_A=25^\circ\text{C}$	I_D	4		A
	$T_A=100^\circ\text{C}$		2.4		
Pulsed Drain Current ^{1,2}		I_{DM}	16		A
Total Power Dissipation	$T_A=25^\circ\text{C}$	Pd	TO-220F	33	W
			TO-252	57	
Operating Temperature Range		T_{Opr}	-55-150		$^\circ\text{C}$
Storage Temperature Range		T_{stg}	-55-150		$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol		TYP	Unit
Thermal Resistance, Junction-to-Case	R θ JC	TO-220F	3.8	$^\circ\text{C/W}$
		TO-252	2.2	

Electrical Characteristics

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	600	650	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	2.8	4.0	V
Gate-Body Leakage	I_{GSS}	$V_{DS}=0V, V_{GS}=30V$	-	1.1	100	nA
		$V_{DS}=0V, V_{GS}=-30V$	-	0.1	-100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=600V, V_{GS}=0V$	-	0.1	20	μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=2A$	-	1.85	2.3	Ω
Forward Transconductance	g_{FS}	$V_{DS}=15V, I_D=2A$	-	3.2	10	S
Drain-Source Diode Forward Continuous Current	I_S	$V_{GS}=0V$	-	-	4	A
Source-drain (diode forward) voltage	V_{SD}	$V_{GS}=0V, I_D=2A$		0.85	1.4	V
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=25V,$ $V_{GS}=0V,$ $f=1MHz$	-	676	-	pF
Output Capacitance	C_{oss}		-	92.1	-	
Reverse Transfer Capacitance	C_{rss}		-	19.7	-	
Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=300V,$ $R_G=10\Omega$ $V_{GS}=10V,$ $I_D=4A$	-	21.8	-	ns
Rise Time	t_r		-	13.2	-	
Turn-Off Delay Time	$t_{d(off)}$		-	46.8	-	
Fall-Time	t_f		-	12.6	-	
Total Gate Charge	Q_g	$V_{DS}=300V,$ $V_{GS}=10V,$ $I_D=4A$		15.6	-	nC
Gate-Source Charge	Q_{gs}		-	3.16	-	
Gate-Drain Charge	Q_{gd}		-	6.76	-	

- 1、Repetitive rating, pulse width limited by junction temperature.
- 2、Pulse width <300us , duty cycle <2%.
- 3、 $I_{SD}=4.0A, di/dt \leq 100A/\mu s, V_{DD} \leq BV_{DSS}, T_J \leq 150^\circ C$.
- 4、 $L=10mH, V_{DD}=50V, I_D=4.0A, R_G=25\Omega, Starting T_J=25^\circ C$.

Typical performance characteristics

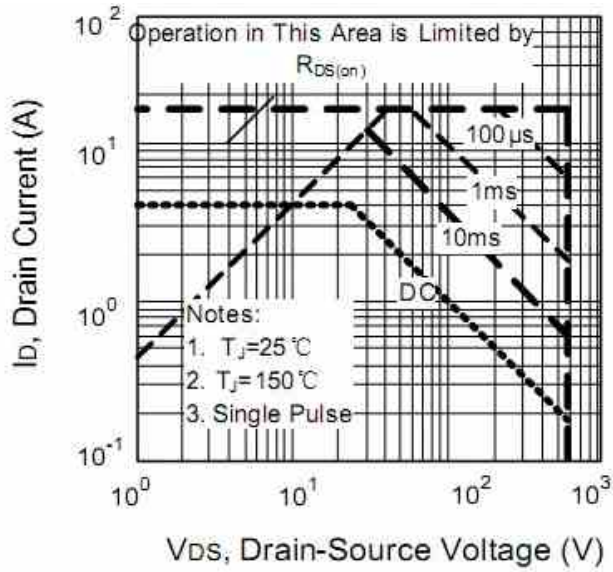


Figure 1 Maximum Safe Operating Area

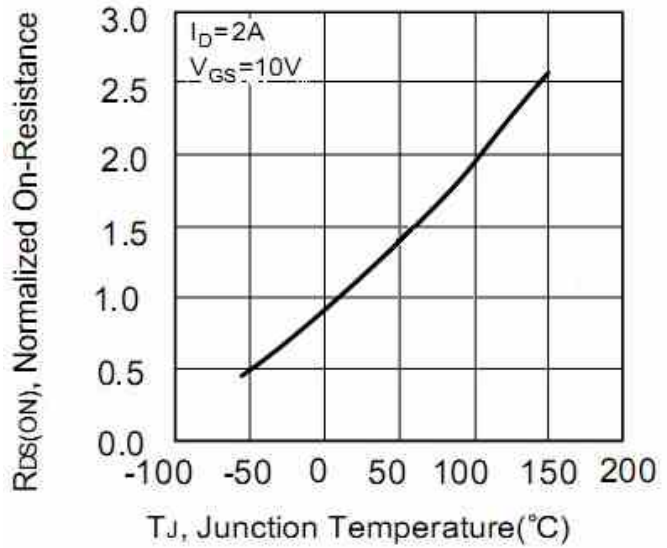


Figure 2. Normalized On-Resistance Variation with Temperature

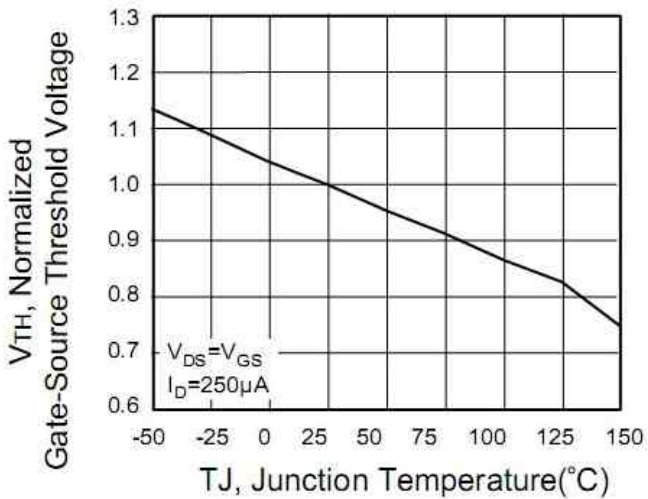


Figure 3. Gate Threshold Variation with Temperature

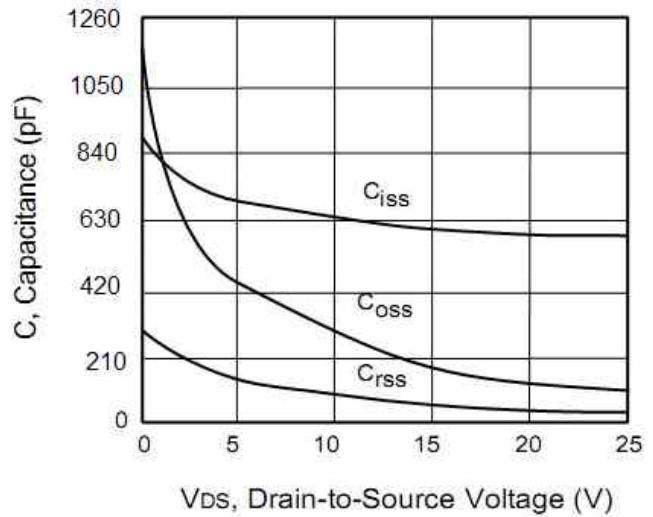


Figure 4. Capacitance Characteristics

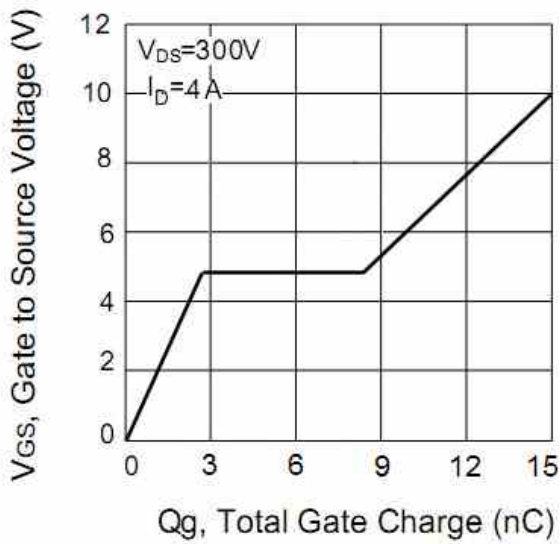


Figure 5. Gate Charge Characteristics

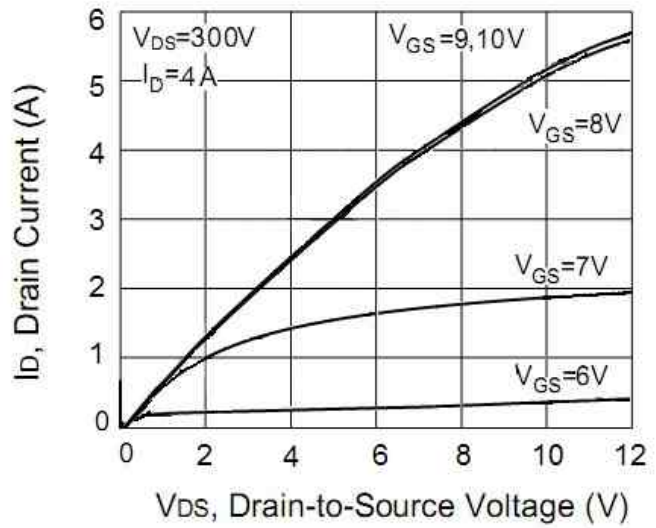


Figure 6. On-State Characteristics

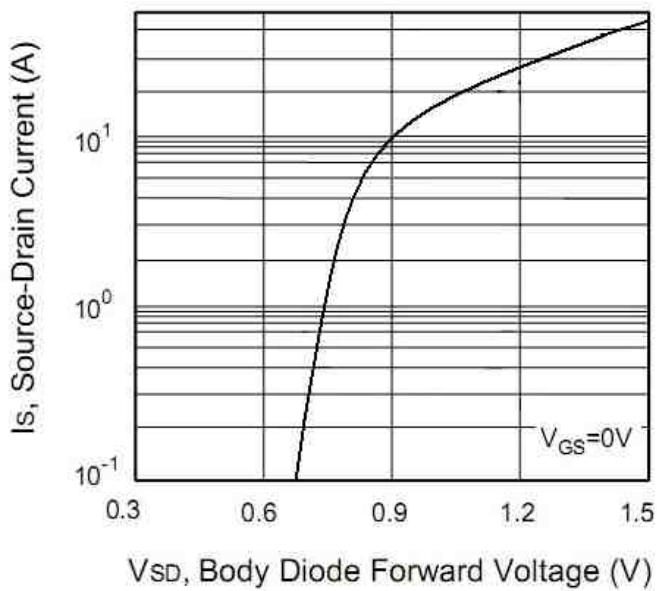


Figure 7. Body Diode Forward Voltage Variation with Source Current

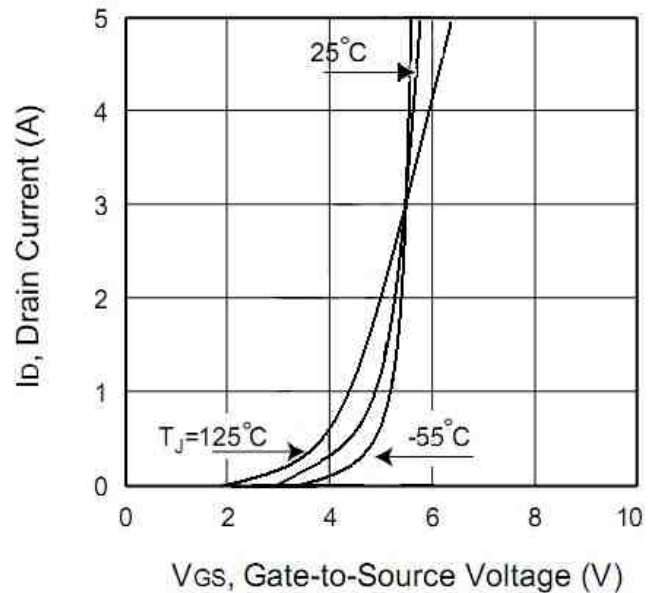


Figure 8. Transfer Characteristics

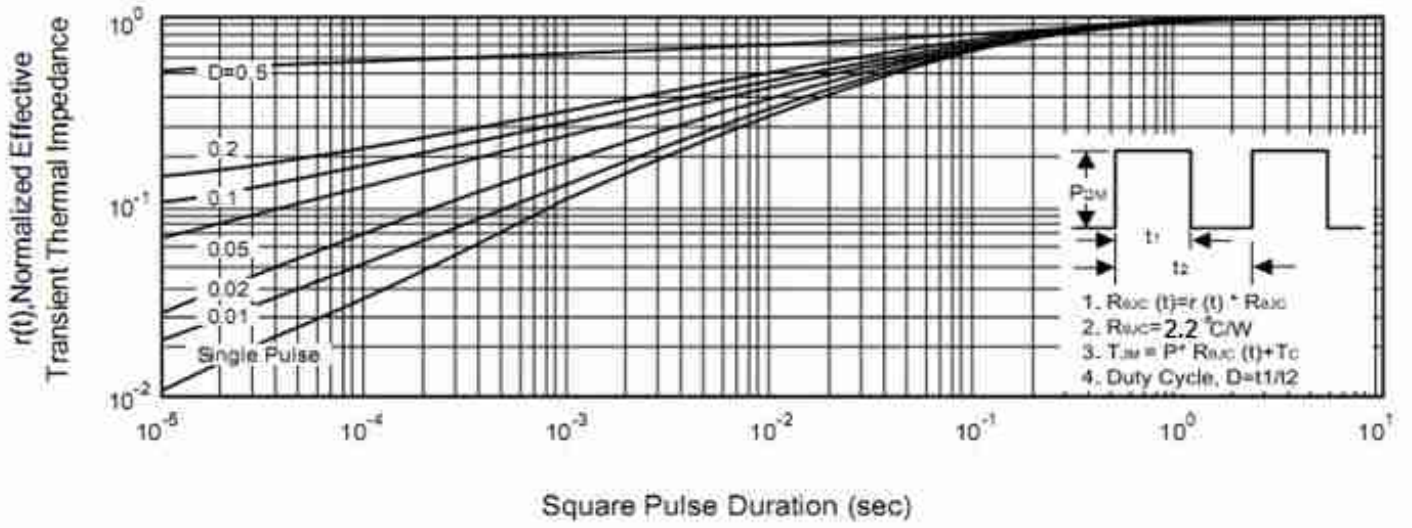
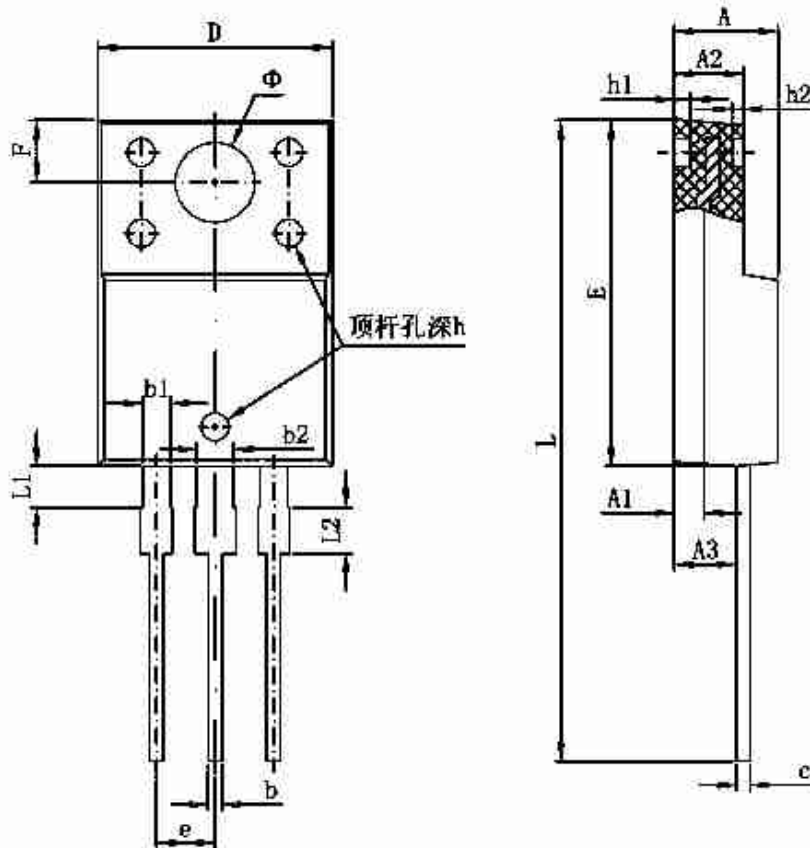


Figure 9 Normalized Effective Transient Thermal Impedance With Pulse Duration

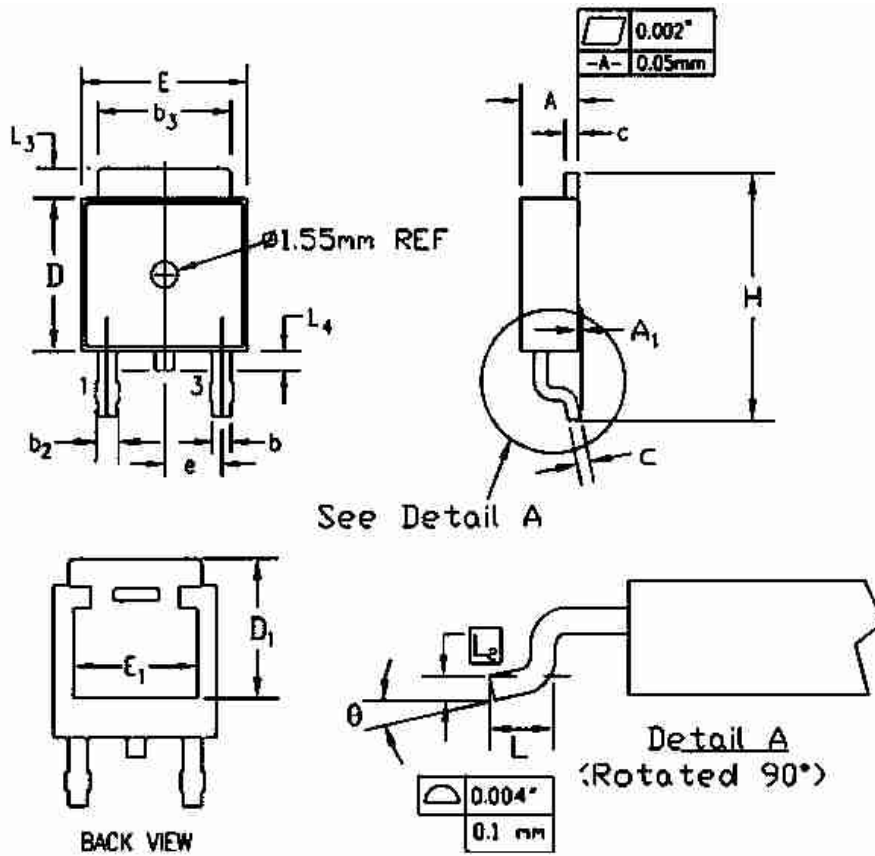
Package Information

Package Type: TO-220F



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	4.30	4.70	0.169	0.185
A1	1.30REF		0.051REF	
A2	2.80	3.20	0.110	0.126
A3	2.50	2.90	0.098	0.114
b	0.50	0.75	0.020	0.030
b1	1.10	1.35	0.043	0.053
b2	1.50	1.75	0.059	0.069
c	0.50	0.75	0.020	0.030
D	9.96	10.36	0.392	0.408
E	14.8	15.2	0.583	0.598
e	2.54REF		0.100REF	
F	2.70REF		0.106REF	
Φ	3.50REF		0.138REF	
h	0.00	0.30	0.00	0.012
h1	0.80REF		0.031REF	
h2	0.50REF		0.020REF	
L	28.0	28.4	1.102	1.118
L1	1.70	1.90	0.067	0.075
L2	1.90	2.10	0.075	0.083

Package Type:TO-252



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	2.19	2.38	0.086	0.094
A1	-	0.13	-	0.005
b	0.64	0.89	0.025	0.035
b2	0.84	1.14	0.033	0.045
b3	5.21	5.46	0.205	0.215
c	0.46	0.61	0.018	0.024
D	5.97	6.22	0.235	0.250
D1	5.21	-	0.205	-
E	6.35	6.73	0.250	0.265
E1	4.83	-	0.190	-
e	2.29REF		0.090REF	
H	9.65	10.41	0.380	0.410
L	1.40	1.78	0.055	0.070
L2	0.51REF		0.020REF	
L3	0.89	1.27	0.035	0.050
L4	0.64	1.01	0.025	0.040
θ	0°	8°	0°	8°

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N-CHANNEL POWER MOSFET MEM7N60

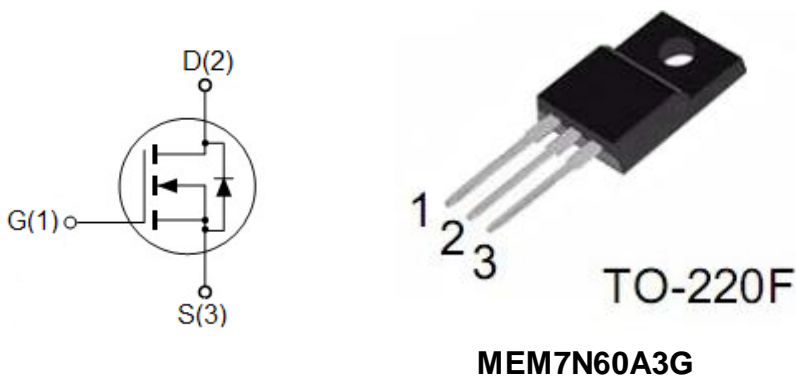
General Description

- Switching regulator application.
- High voltage and high speed.
- Switching application.

Features

- 600V, 7A
- $R_{DS(ON)}=1.2\Omega$ @ $V_{GS}=10V$
- LOW CR_{SS}
- FAST SWITCHING
- PACKAGE : TO220-F

Pin Configuration



Maximum Ratings($T_A=25^\circ C$)

Parameter		Symbol	Ratings	Unit
Drain-Source Voltage		V_{DSS}	600V	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	$T_A=25^\circ C$	I_D	7	A
	$T_A=100^\circ C$		3.6	
Pulsed Drain Current ^{1,2}		I_{DM}	24	A
Total Power Dissipation	$T_A=25^\circ C$	P_d	38	W
Operating Temperature Range		T_{Opr}	-55-150	$^\circ C$
Storage Temperature Range		T_{stg}	-55-150	$^\circ C$

Thermal Characteristics

Parameter	Symbol	TYP.	MAX.	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.5	3	$^\circ C/W$

Electrical Characteristics

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	600	650	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	2.8	4.0	V
Gate-Body Leakage	I_{GSS}	$V_{DS}=0V, V_{GS}=30V$	-	0.8	100	nA
		$V_{DS}=0V, V_{GS}=-30V$	-	-4	-100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=600V, V_{GS}=0V$	-	0.2	20	μA
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=3A$	-	0.82	1.2	Ω
Forward Transconductance	g_{FS}	$V_{DS}=15V, I_D=3A$	-	2	10	S
Drain-Source Diode Forward Continuous Current	I_S	$V_{GS}=0V$	-	-	2	A
Source-drain (diode forward) voltage	V_{SD}	$V_{GS}=0V, I_D=7A$		0.80	1.4	V
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 25 V,$ $V_{GS} = 0 V,$ $f = 1 MHz$	-	1260	-	pF
Output Capacitance	C_{oss}		-	152	-	
Reverse Transfer Capacitance	C_{rss}		-	24	-	
Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 300 V,$ $R_G = 10\Omega$ $V_{GS} = 10V,$ $I_D = 7A$	-	27.5	-	ns
Rise Time	t_r		-	8.2	-	
Turn-Off Delay Time	$t_{d(off)}$		-	48.8	-	
Fall-Time	t_f		-	12.1	-	
Total Gate Charge	Q_g	$V_{DS} = 300V,$ $V_{GS} = 10V,$ $I_D = 7A$		31.4	-	nC
Gate-Source Charge	Q_{gs}		-	8.2	-	
Gate-Drain Charge	Q_{gd}		-	12.2	-	

- 1、Repetitive rating, pulse width limited by junction temperature.
- 2、Pulse width <300us , duty cycle <2%.
- 3、 $I_{SD} \leq 6.0A, di/dt \leq 100A/\mu s, V_{DD} \leq BV_{DSS}, T_J \leq 150^\circ C$.
- 4、 $L=1.2mH, V_{DD}=50V, I_D=6.9A, R_G=25\Omega, Starting T_J=25^\circ C$.

Typical performance characteristics

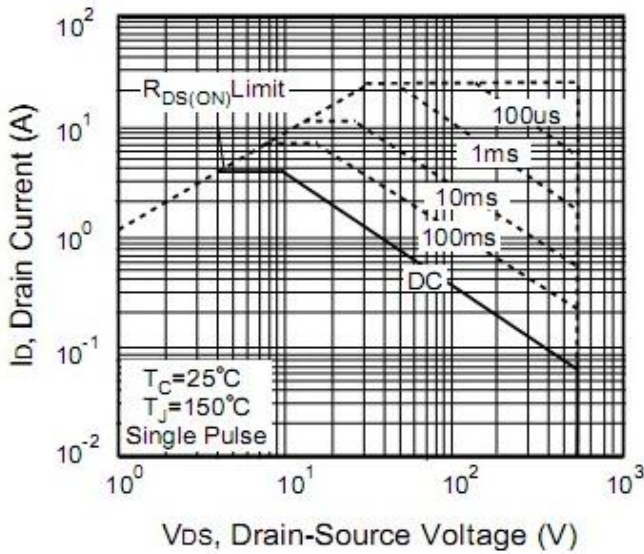


Figure 1 Maximum Safe Operating Area

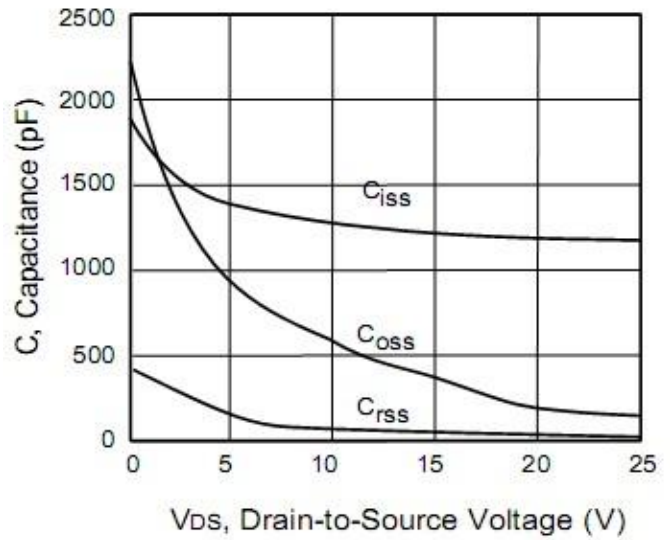


Figure 2. Capacitance Characteristics

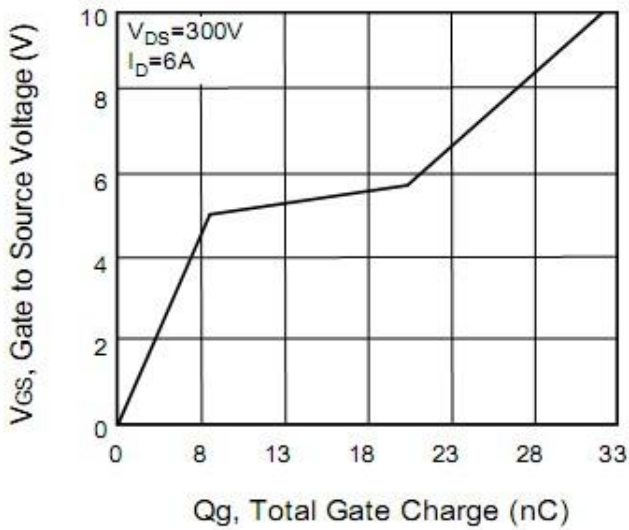


Figure 3. Gate Charge Characteristics

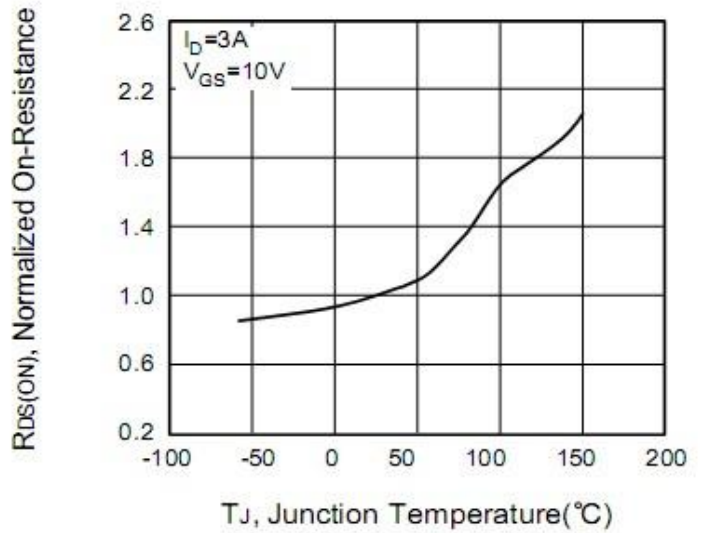


Figure 4. Normalized On-Resistance Variation with Temperature

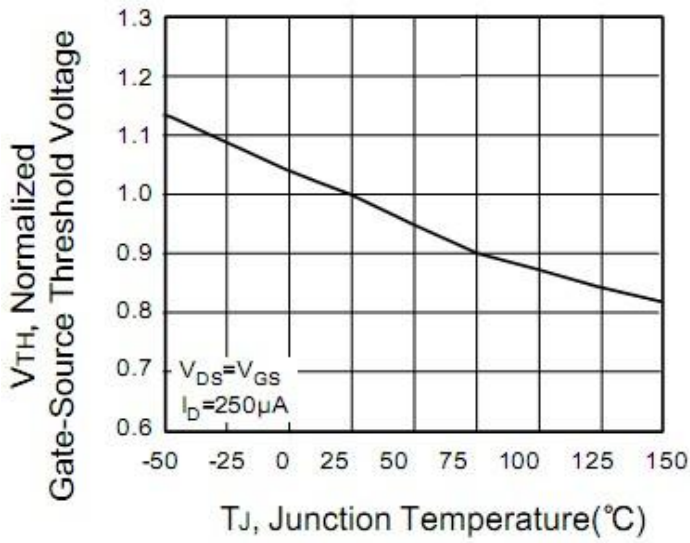


Figure 5. Gate Threshold Variation with Temperature

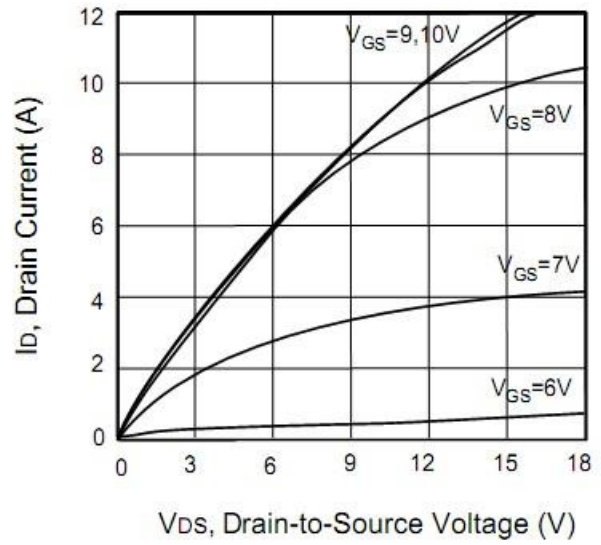


Figure 6. On-State Characteristics

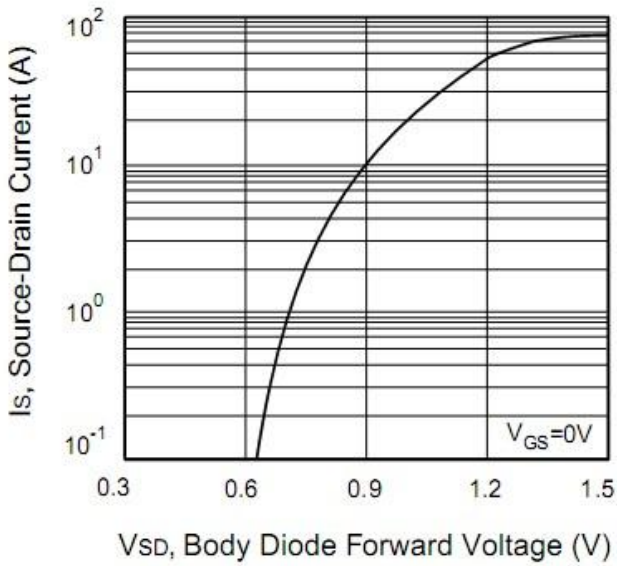


Figure 7. Body Diode Forward Voltage Variation with Source Current

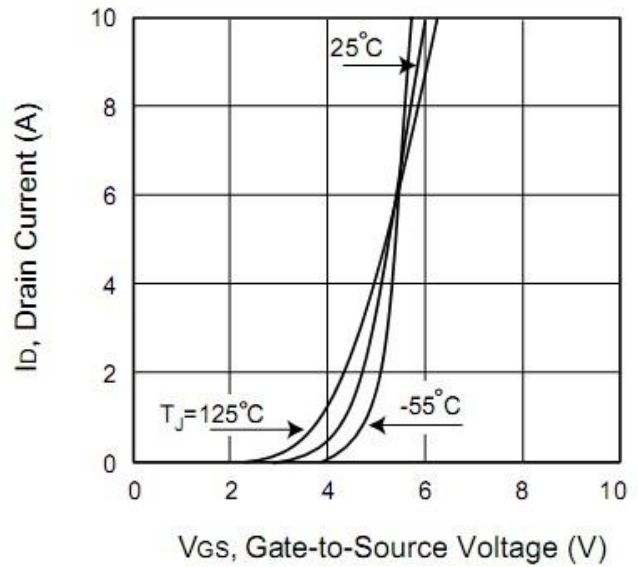


Figure 8. Transfer Characteristics

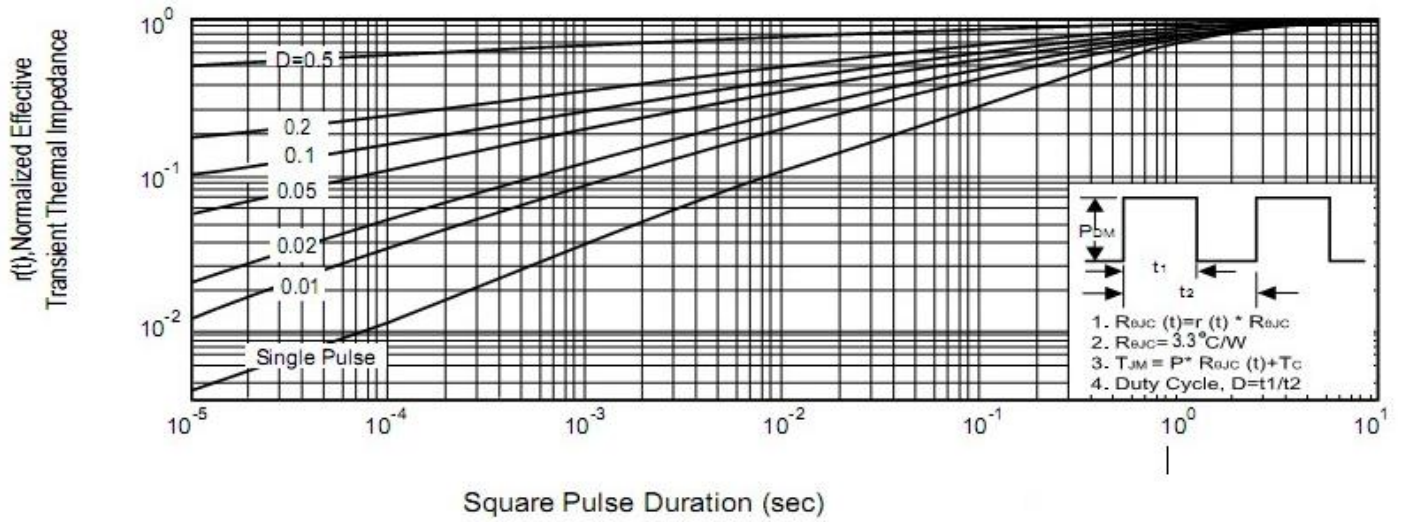
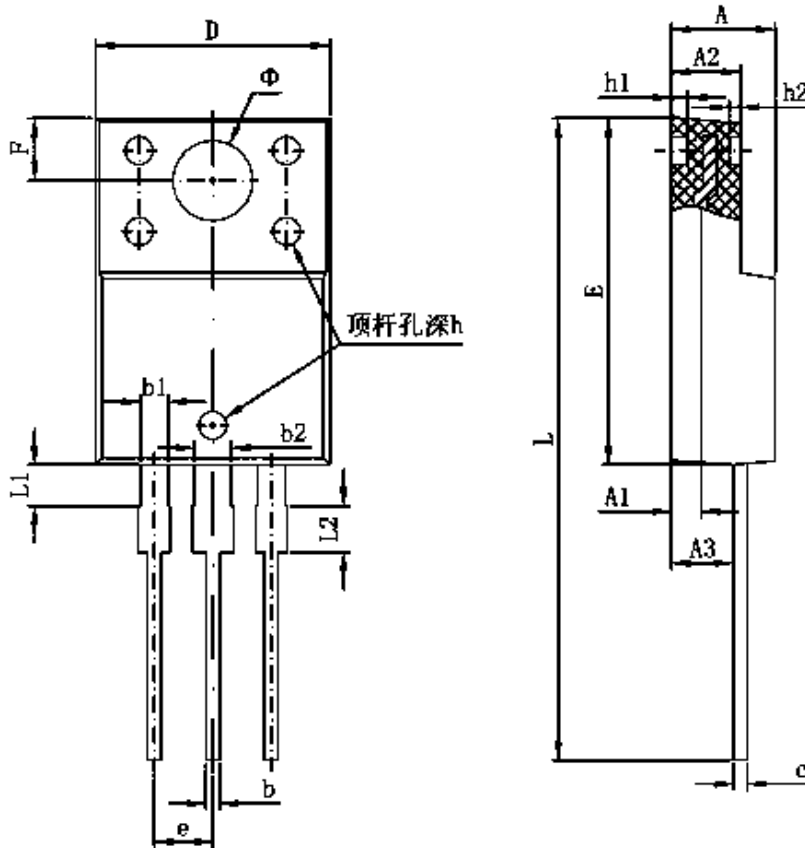


Figure 9 Normalized Effective Transient Thermal Impedance With Pulse Duration

Package Information

Package Type: TO-220F



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	4.30	4.70	0.169	0.185
A1	1.30REF		0.051REF	
A2	2.80	3.20	0.110	0.126
A3	2.50	2.90	0.098	0.114
b	0.50	0.75	0.020	0.030
b1	1.10	1.35	0.043	0.053
b2	1.50	1.75	0.059	0.069
c	0.50	0.75	0.020	0.030
D	9.96	10.36	0.392	0.408
E	14.8	15.2	0.583	0.598
e	2.54REF		0.100REF	
F	2.70REF		0.106REF	
Φ	3.50REF		0.138REF	
h	0.00	0.30	0.00	0.012
h1	0.80REF		0.031REF	
h2	0.50REF		0.020REF	
L	28.0	28.4	1.102	1.118
L1	1.70	1.90	0.067	0.075
L2	1.90	2.10	0.075	0.083

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N-CHANNEL POWER MOSFET MEM10N60

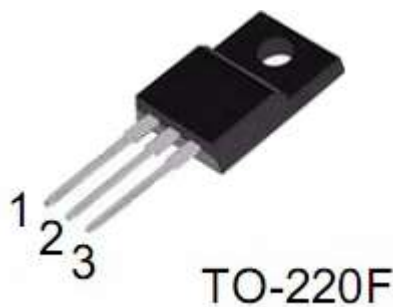
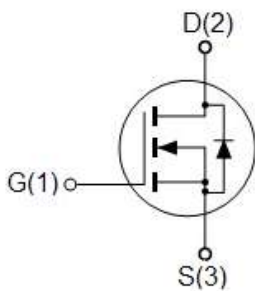
General Description

- Switching regulator application.
- High voltage and high speed.
- Switching application.

Features

- 600V, 10A
- $R_{DS(ON)}=0.75\Omega$ @ $V_{GS}=10V$
- LOW CRSS
- FAST SWITCHING
- PACKAGE : TO-220F

Pin Configuration



MEM10N60A3G

Maximum Ratings($T_A=25^\circ\text{C}$)

Parameter		Symbol	Ratings	Unit
Drain-Source Voltage		V_{DSS}	600V	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	$T_A=25^\circ\text{C}$	I_D	10	A
	$T_A=100^\circ\text{C}$		6	
Pulsed Drain Current ^{1,2}		I_{DM}	40	A
Total Power Dissipation	$T_A=25^\circ\text{C}$	P_d	50	W
Operating Temperature Range		T_{Opr}	-55-150	$^\circ\text{C}$
Storage Temperature Range		T_{stg}	-55-150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	TYP.	MAX.	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.5	3	$^\circ\text{C/W}$

Electrical Characteristics

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	600	650	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	3.1	4.0	V
Gate-Body Leakage	I_{GSS}	$V_{DS}=0V, V_{GS}=30V$	-	0.8	100	nA
		$V_{DS}=0V, V_{GS}=-30V$	-	-4	-100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=600V, V_{GS}=0V$	-	0.8	20	μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=5A$	-	0.61	0.75	Ω
Forward Transconductance	g_{FS}	$V_{DS}=15V, I_D=5A$	-	7	10	S
Drain-Source Diode Forward Continuous Current	I_S	$V_{GS}=0V$	-	-	10	A
Source-drain (diode forward) voltage	V_{SD}	$V_{GS}=0V, I_D=10A$		0.80	1.4	V
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=25V,$ $V_{GS}=0V,$ $f=1MHz$	-	1735	-	pF
Output Capacitance	C_{oss}		-	194	-	
Reverse Transfer Capacitance	C_{rss}		-	26	-	
Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=300V,$ $R_G=10\Omega,$ $V_{GS}=10V,$ $I_D=10A$	-	31	-	ns
Rise Time	t_r		-	8	-	
Turn-Off Delay Time	$t_{d(off)}$		-	70	-	
Fall-Time	t_f		-	14	-	
Total Gate Charge	Q_g	$V_{DS}=300V,$ $V_{GS}=10V,$ $I_D=10A$		46	-	nC
Gate-Source Charge	Q_{gs}		-	12	-	
Gate-Drain Charge	Q_{gd}		-	17	-	

- 1、Repetitive rating, pulse width limited by junction temperature.
- 2、Pulse width <300us , duty cycle <2%.
- 3、 $I_{SD}=10A, di/dt \leq 100A/\mu s, V_{DD} \leq BV_{DSS}, T_J \leq 150^\circ C$.
- 4、 $L=0.75mH, V_{DD}=50V, I_D=10A, R_G=25\Omega, Starting T_J=25^\circ C$.

Typical performance characteristics

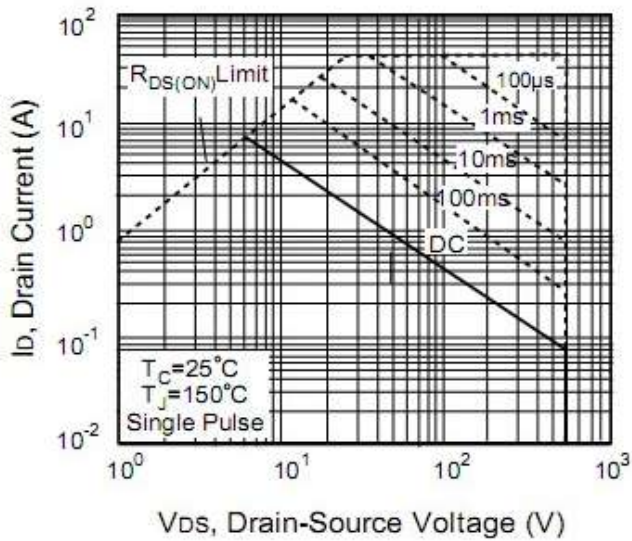


Figure 1. Maximum Safe Operating Area

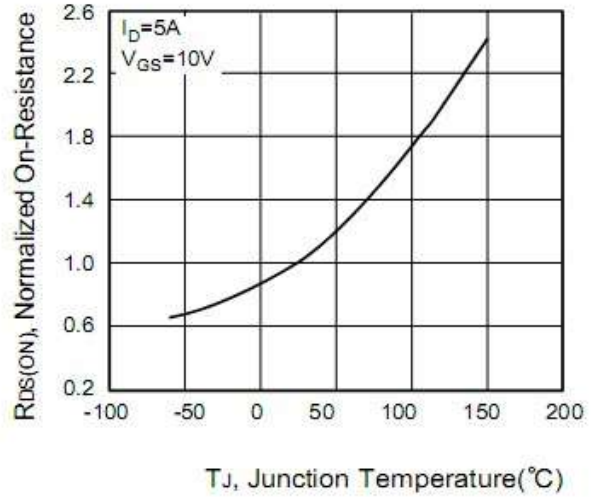


Figure 2. Normalized On-Resistance Variation with Temperature

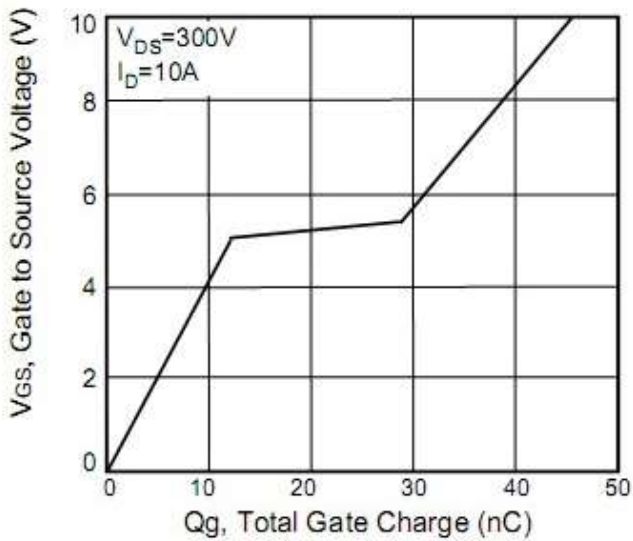


Figure 3. Gate Charge Characteristics

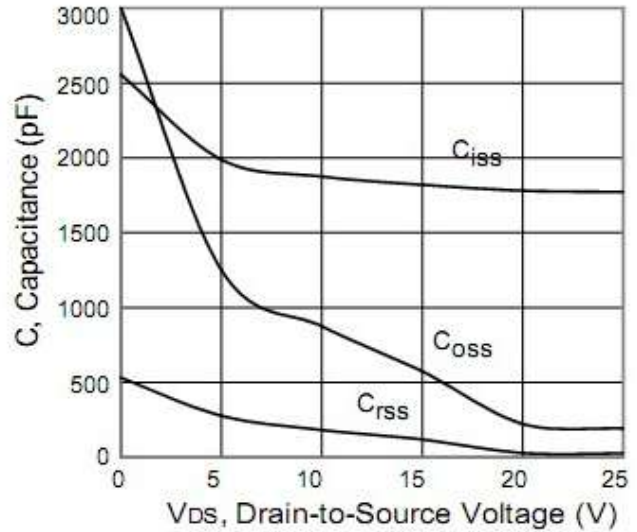


Figure 4. Capacitance Characteristics

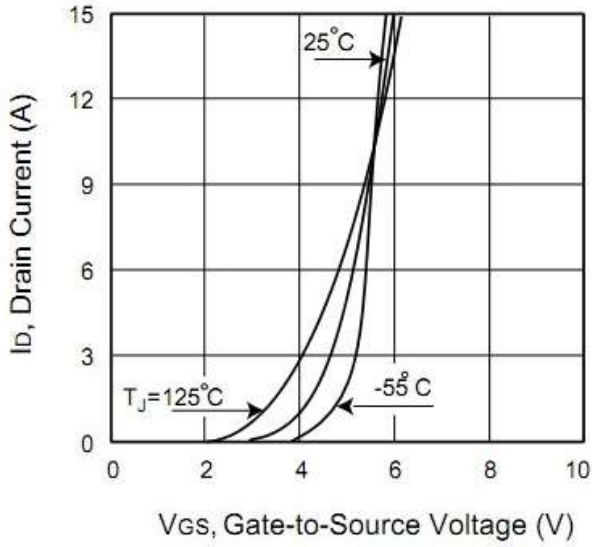


Figure 5. Transfer Characteristics

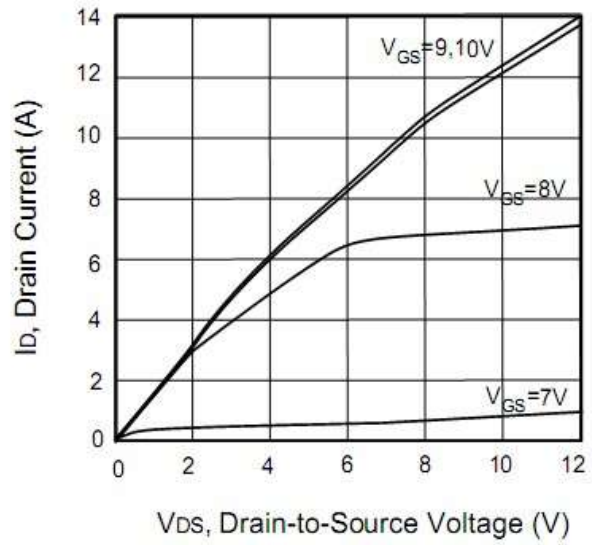


Figure 6. On-State Characteristics

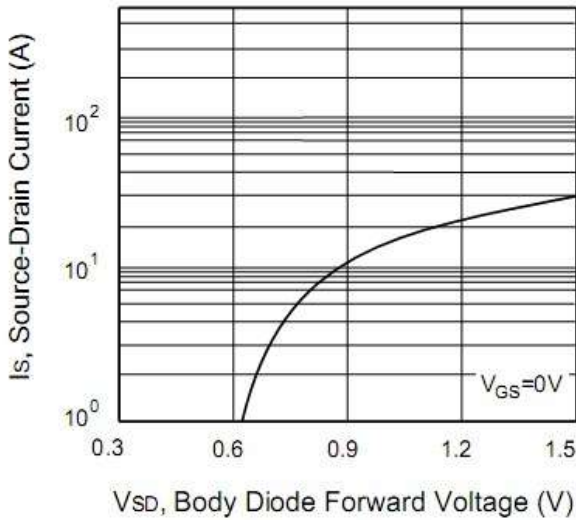


Figure 7. Body Diode Forward Voltage Variation with Source Current

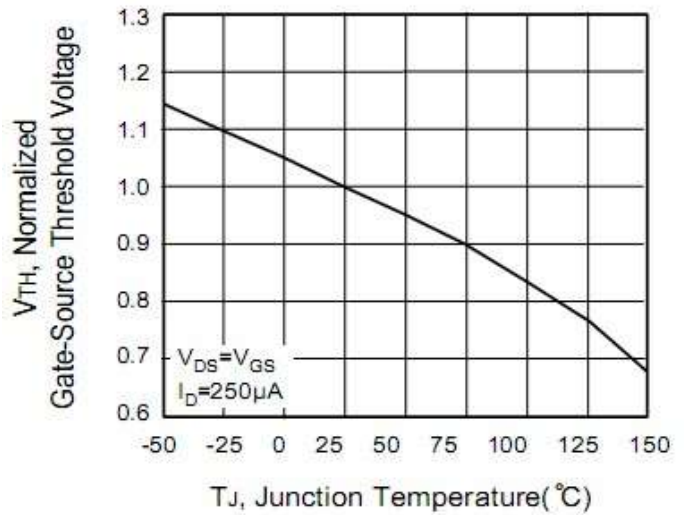


Figure 8. Gate Threshold Variation with Temperature

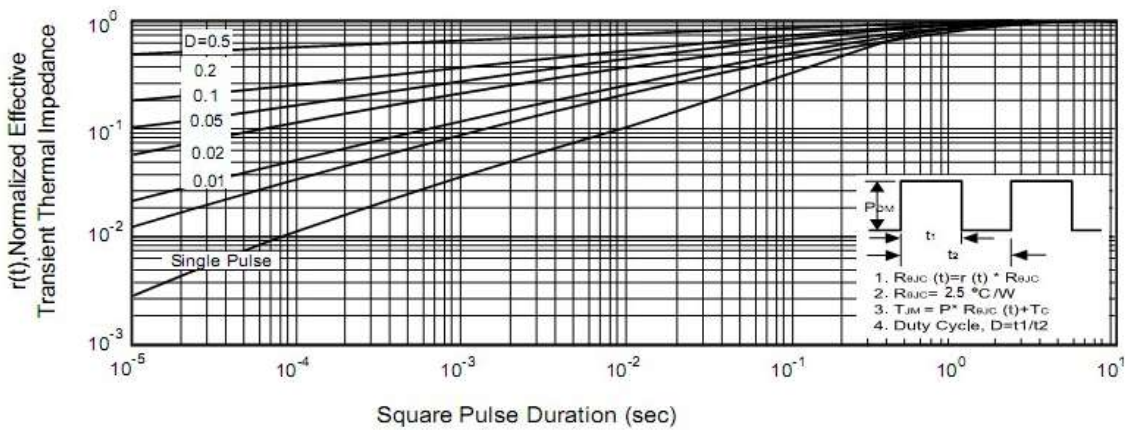
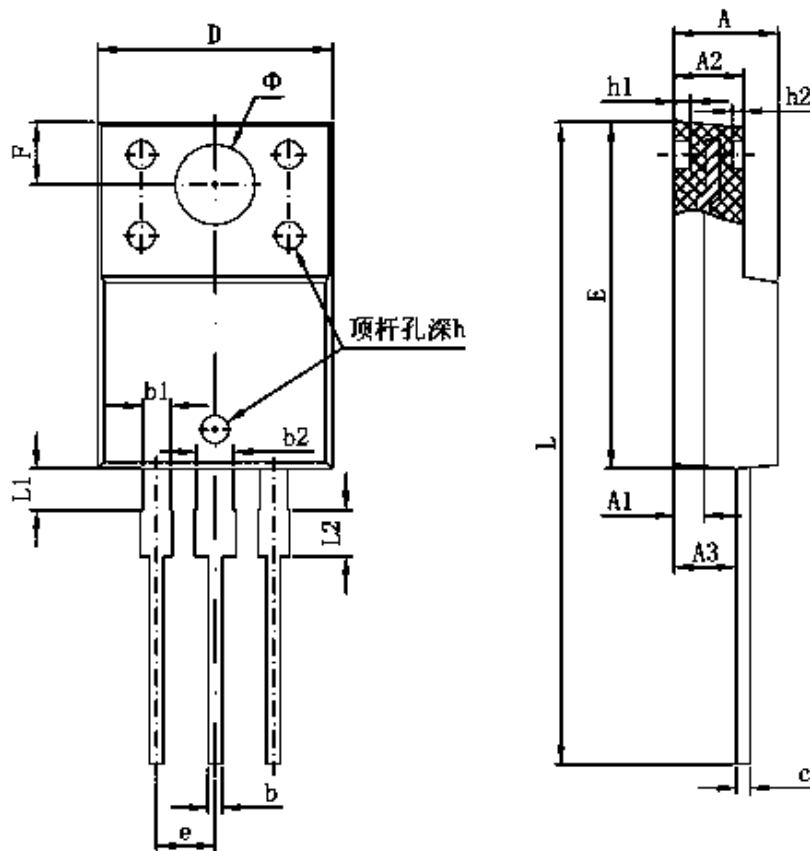


Figure 9. Normalized Effective Transient Thermal Impedance With Pulse Duration

Package Information

Package Type: TO-220F



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	4.30	4.70	0.169	0.185
A1	1.30REF		0.051REF	
A2	2.80	3.20	0.110	0.126
A3	2.50	2.90	0.098	0.114
b	0.50	0.75	0.020	0.030
b1	1.10	1.35	0.043	0.053
b2	1.50	1.75	0.059	0.069
c	0.50	0.75	0.020	0.030
D	9.96	10.36	0.392	0.408
E	14.8	15.2	0.583	0.598
e	2.54REF		0.100REF	
F	2.70REF		0.106REF	
Φ	3.50REF		0.138REF	
h	0.00	0.30	0.00	0.012
h1	0.80REF		0.031REF	
h2	0.50REF		0.020REF	
L	28.0	28.4	1.102	1.118
L1	1.70	1.90	0.067	0.075
L2	1.90	2.10	0.075	0.083

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N-CHANNEL POWER MOSFET MEM12N60

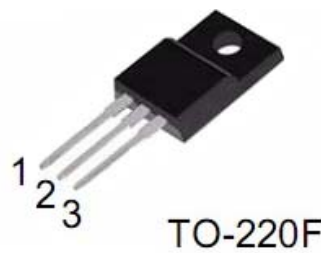
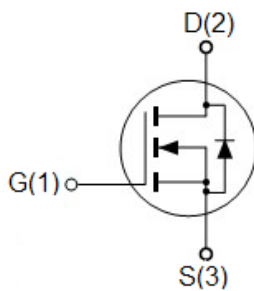
General Description

The MEM12N60 is a high voltage and high current power MOSFET, designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits

Features

- 600V, 12A
- $R_{DS(ON)}=0.7\Omega@V_{GS}=10V$
- LOW Crss
- Fast Switching
- Avalanche energy specified
- Package : TO220-F

Pin Configuration



MEM10N60A3G

Maximum Ratings(Ta=25°C)

Parameter		Symbol	Ratings	Unit
Drain-Source Voltage		V_{DSS}	600V	V
Gate-Source Voltage		V_{GSS}	±30	V
Drain Current	$T_A=25^\circ C$	I_D	12 ▲	A
	$T_A=100^\circ C$		7.4 ▲	
Pulsed Drain Current ^{1,2}		I_{DM}	48 ▲	A
Total Power Dissipation	$T_A=25^\circ C$	P_d	50	W
Operating Temperature Range		T_{Opr}	-55-150	°C
Storage Temperature Range		T_{stg}	-55-150	°C

▲ Drain current limited by maximum junction temperature.

Thermal Characteristics

Parameter	Symbol	TYP.	MAX.	Unit
Thermal Resistance, Junction-to-Case	R θ JC	2.4	3	°C/W

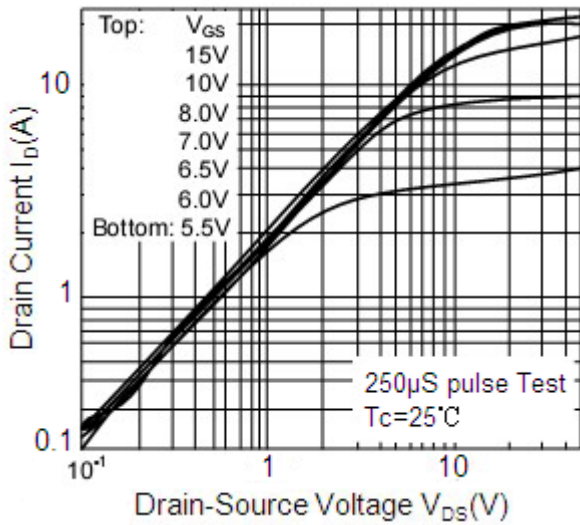
Electrical Characteristics

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} =0V, I _D =250 μ A	600	650	-	V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250 μ A	2.2	3.4	3.8	V
Gate-Body Leakage	I _{GSS}	V _{DS} =0V, V _{GS} =30V	-	-	100	nA
		V _{DS} =0V, V _{GS} =-30V	-	-	-100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =600V V _{GS} =0V	-	0.1	20	μ A
Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =6A	-	0.54	0.7	Ω
Forward Transconductance	g _{FS}	V _{DS} =40V, I _D =6A	-	13	-	S
Drain-Source Diode Forward Continuous Current	I _S	V _{GS} =0V	-	-	12	A
Source-drain (diode forward) voltage	V _{SD}	V _{GS} =0V, I _D =10A		0.9	1.3	V
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz	-	1750	-	pF
Output Capacitance	C _{oss}		-	185	-	
Reverse Transfer Capacitance	C _{rss}		-	22	-	
Switching Characteristics						
Turn-On Delay Time	t _{d(on)}	V _{DD} = 300 V, R _G = 25 Ω I _D = 12A	-	30	-	ns
Rise Time	t _r		-	100	-	
Turn-Off Delay Time	t _{d(off)}		-	105	-	
Fall-Time	t _f		-	90	-	
Total Gate Charge	Q _g	V _{DS} = 400V, V _{GS} = 10V, I _D = 12A		45	-	nC
Gate-Source Charge	Q _{gs}		-	8.5	-	
Gate-Drain Charge	Q _{gd}		-	21	-	

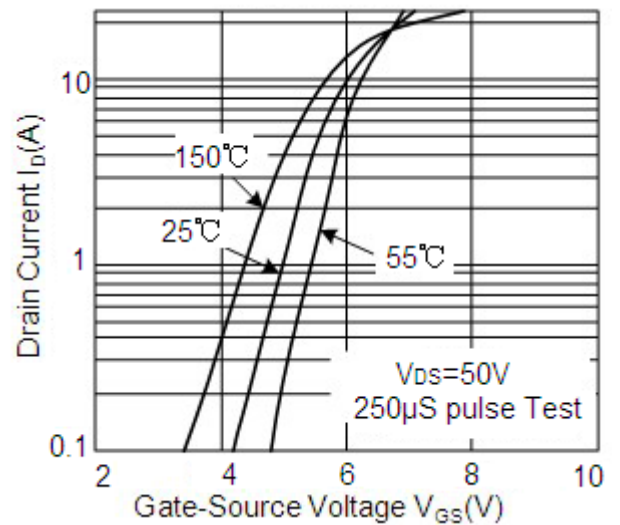
- 1、Repetitive rating, pulse width limited by junction temperature.
- 2、Pulse width <300 μ s , duty cycle <2%.
- 3、I_{SD}≤12A di/dt≤200A/ μ s, V_{DD}≤BV_{DSS}, T_J≤150°C.
- 4、L=10mH, V_{DD}=50V, I_D=12A, R_G=25 Ω , Starting T_J=25°C.

Typical performance characteristics

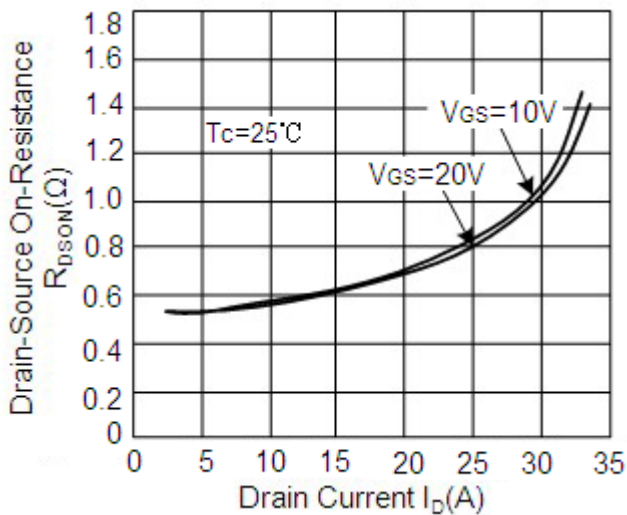
On-Stage characteristics



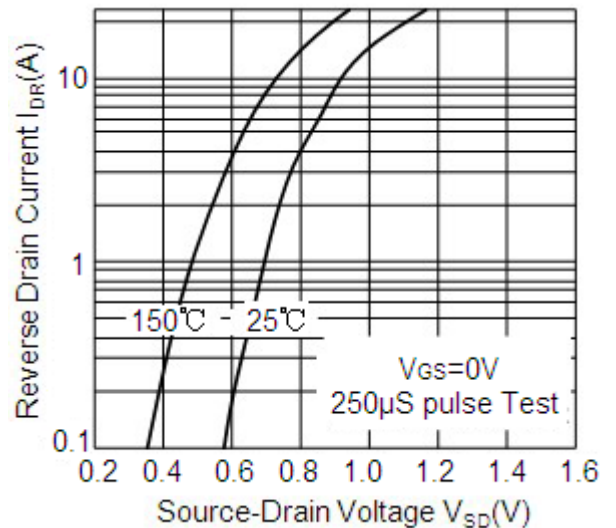
Transfer characteristics



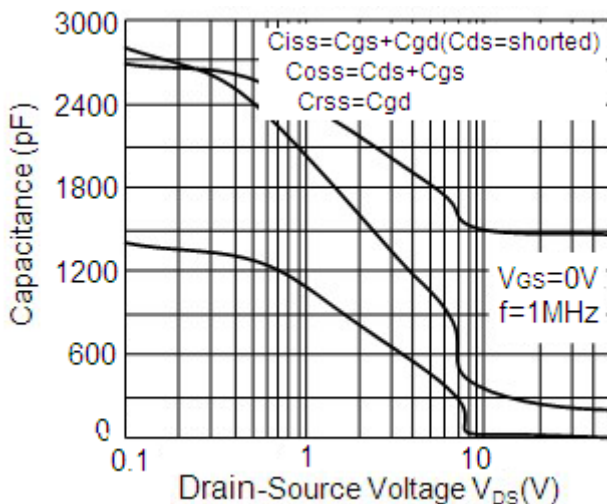
On-Resistance Variation vs. Drain Current and Gate Voltage



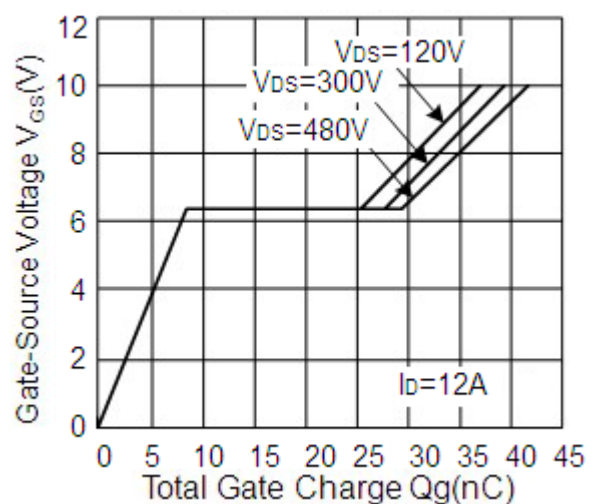
Body Diode forward Voltage vs. Source Current



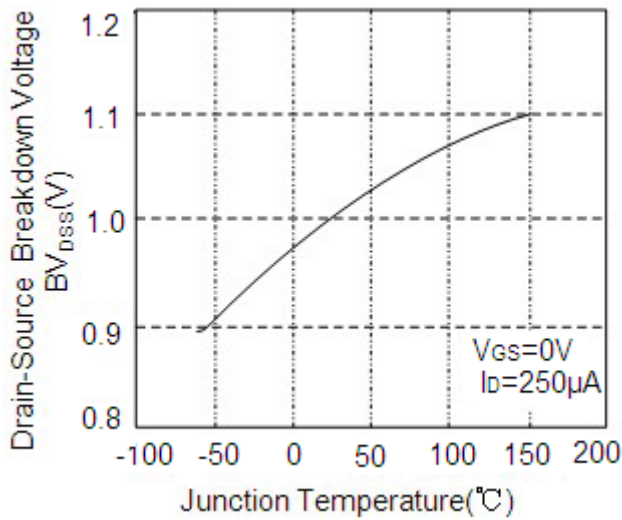
Capacitance characteristics



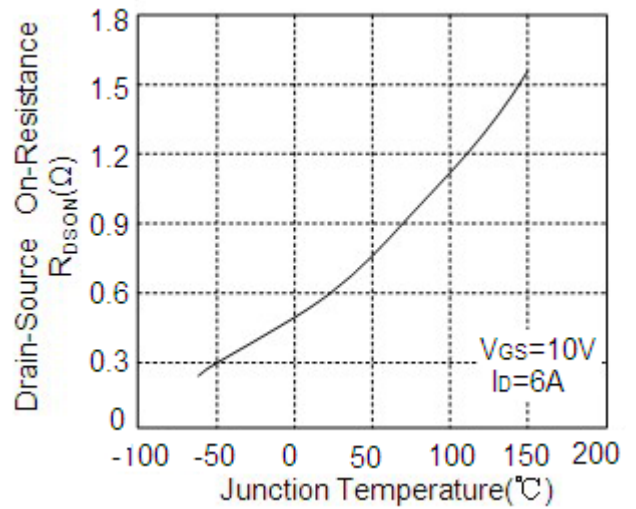
Gate Charge characteristics



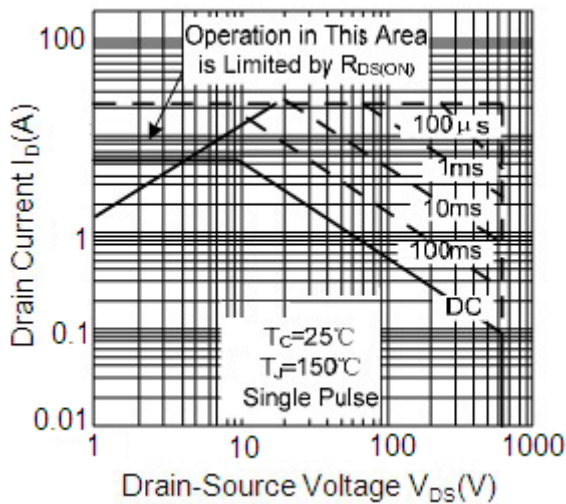
**Breakdown Voltage Variation
Vs. Temperature**



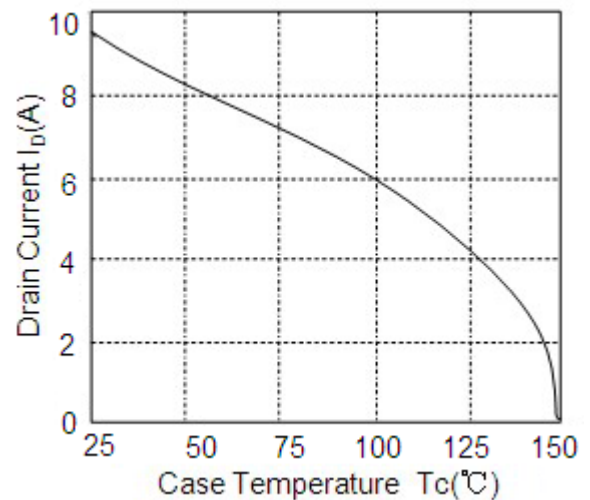
On-Resistance vs. Temperature



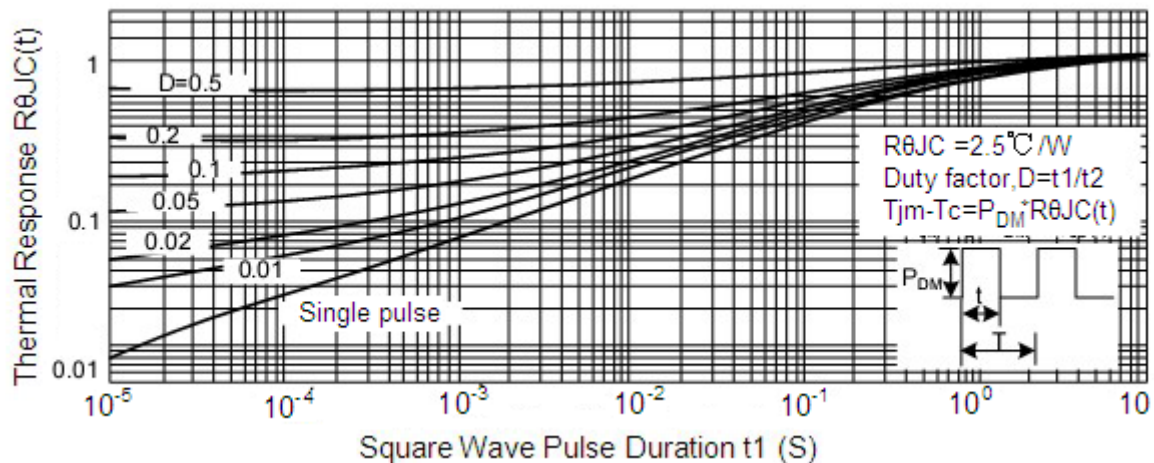
Maximum safe operating area



**Maximum Drain Current vs.
Case Temperature**

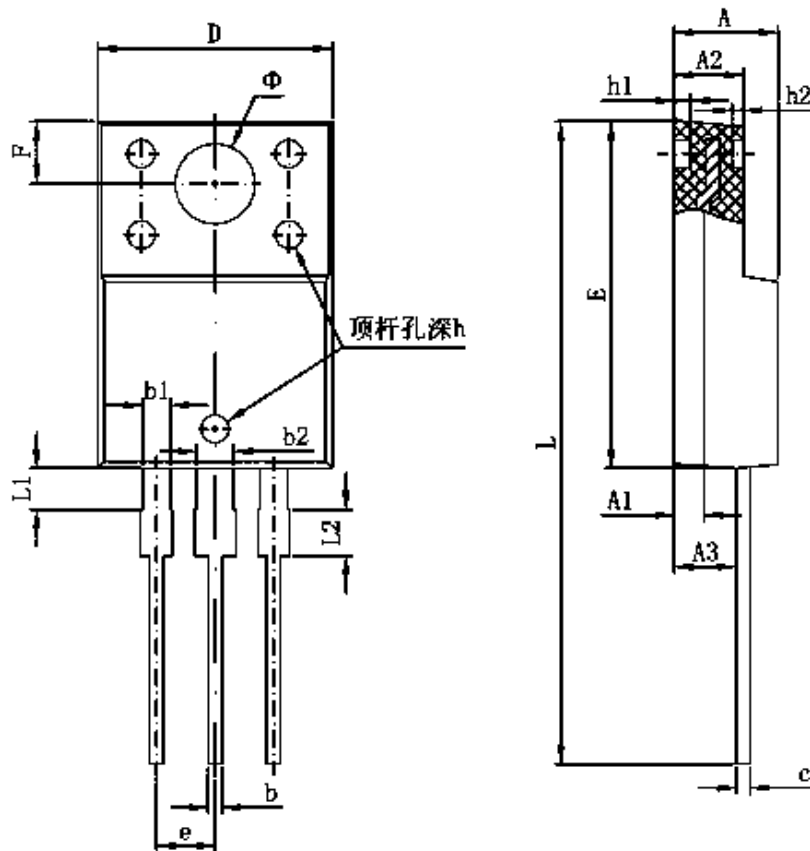


Transient Thermal Response Curve



Package Information

Package Type: TO-220F



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	4.30	4.70	0.169	0.185
A1	1.30REF		0.051REF	
A2	2.80	3.20	0.110	0.126
A3	2.50	2.90	0.098	0.114
b	0.50	0.75	0.020	0.030
b1	1.10	1.35	0.043	0.053
b2	1.50	1.75	0.059	0.069
c	0.50	0.75	0.020	0.030
D	9.96	10.36	0.392	0.408
E	14.8	15.2	0.583	0.598
e	2.54REF		0.100REF	
F	2.70REF		0.106REF	
Φ	3.50REF		0.138REF	
h	0.00	0.30	0.00	0.012
h1	0.80REF		0.031REF	
h2	0.50REF		0.020REF	
L	28.0	28.4	1.102	1.118
L1	1.70	1.90	0.067	0.075
L2	1.90	2.10	0.075	0.083

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