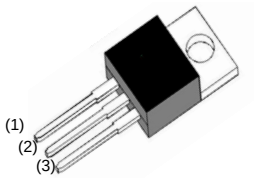
7N60(B)(D)(F)

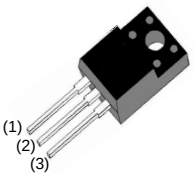
7A N-Channel Power MOSFET

Features

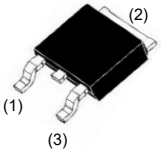
- Low gate charge
- Fast switching
- Improved dv/dt capability
- RoHS product



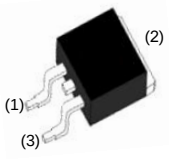
TO-220AB
7N60



ITO-220AB
7N60F



TO-252
7N60D



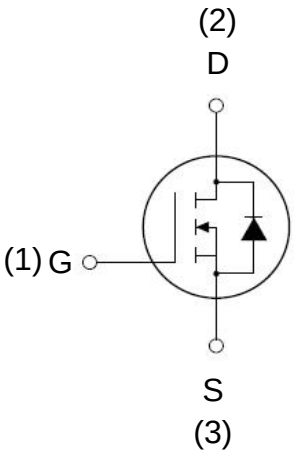
TO-263
7N60B

Mechanical Data

Case : Molded plastic body
Terminals : Solder plated, solderable per MIL-STD-750,Method 2026
Polarity : As marked
Mounting Position : Any

Application

- Cell Phone Charger
- Standby Power
- LED power supplies



Schematic diagram

Maximum Ratings And Electrical Characteristics

Ratings at 25℃ ambient temperature unless otherwise specified. Single phase half-wave 60Hz,resistive or inductive load, for capacitive load current derate by 20%.

ABSOLUTE RATINGS (Tc=25℃)

Parameter	Symbol	Value		Unit
		7N60(B)(D)	7N60F	
Drain-Source Voltage	V_{DSS}	600	600	V
Drain Current -continuous T=25℃	I_D	7.0	7.0*	A
Drain Current -continuous T=100℃	I_D			A
Drain Current - pulse （note 1）	I_{DM}	28	28*	A
Gate-Source Voltage	V_{GSS}	±30		V
Single Pulsed Avalanche Energy（note 2）	E_{AS}	420		mJ
Avalanche Current（note 1）	I_{AR}	7.0		A
Repetitive Avalanche Current（note 1）	E_{AR}	14.7		mJ
Peak Diode Recovery dv/dt（note 3）	dv/dt	5.5		V/ns
Power Dissipation	P_D	147	48	W
	T_C=25℃ -Derate above 25℃	1.18	0.38	W/℃
Operating and Storage Temperature Range	T_J，T_{STG}	-55～+150		℃
Maximum Lead Temperature for Soldering Purposes	T_L	300		℃

*Drain current limited by maximum junction temperature

ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Off –Characteristics						
Drain-Source Voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	600	-	-	V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	I_D=250μA, referenced to 25℃	-	0.65	-	V/℃
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=600V,V_{GS}=0V, T_C=25℃	-	-	-	μA
			-	-	-	μA
Gate-body leakage current, forward	I_{GSSF}	V_{DS}=0V, V_{GS} =30V	-	-	80	nA
Gate-body leakage current, reverse	I_{GSSR}	V_{DS}=0V, V_{GS} =-30V	-	-	-80	nA
On-Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS} , I_D=250μA	2.0	-	4.0	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS} =10V , I_D=3.5A	-	1.06	1.27[6]	Ω
Forward Transconductance	g_{fs}	V_{DS} = 40V, I_D=3.5A（note 4）	-	8.2	-	S
Dynamic Characteristics						
Input capacitance	C_{iss}	V_{DS}=25V, V_{GS} =0V, f=1.0MHz	-	1380	1800	pF
Output capacitance	C_{oss}		-	115	150	pF
Reverse transfer capacitance	C_{rss}		-	23	30	pF

ELECTRICAL CHARACTERISTICS

Switching Characteristics						
Turn-On delay time	$t_d(on)$	V_{DD}=300V,I_D=7A,R_G=25Ω （note 4，5）	-	30	70	ns
Turn-On rise time	t_r		-	80	170	ns
Turn-Off delay time	$t_d(off)$		-	125	260	ns
Turn-Off Fall time	t_f		-	85	180	ns
Total Gate Charge	Q_g	V_{DS} =480V , I_D=7A V_{GS} =10V （note 4，5）	-	54	65	nC
Gate-Source charge	Q_{gs}		-	6.8	-	nC
Gate-Drain charge	Q_{gd}		-	23	-	nC
Drain-Source Diode Characteristics and Maximum Ratings						
Maximum Continuous Drain -Source Diode Forward Current	I_S		-	-	7.0	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}		-	-	28	A
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=7.0A	-	-	1.4	V
Reverse recovery time	t_{rr}	V_{GS}=0V, I_S=7.0A dI_F/dt=100A/μs (note 4)	-	415	-	ns
Reverse recovery charge	Q_{rr}		-	4.6	-	μC

THERMAL CHARACTERISTIC

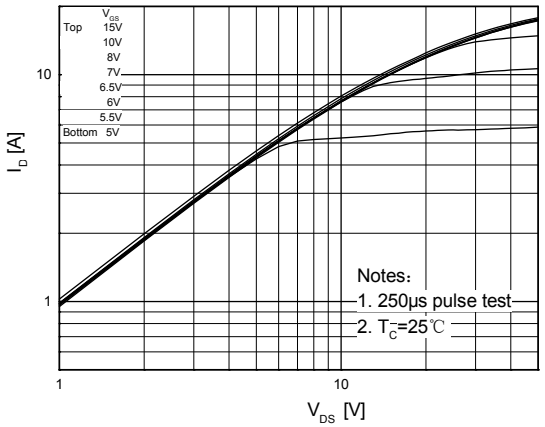
Parameter	Symbol	Max		Unit
		7N60(B)(D)	7N60F	
Thermal Resistance, Junction to Case	$R_{th(j-c)}$	0.85	2.6	℃/W
Thermal Resistance, Junction to Ambient	$R_{th(j-A)}$	62.5	62.5	℃/W

Notes:

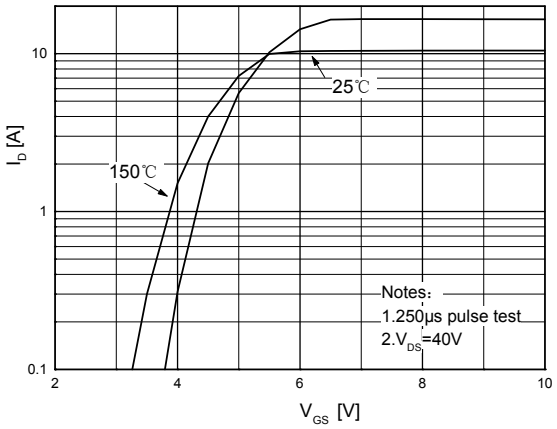
1. Pulse width limited by maximum junction temperature
2. L=15.7mH, I_{AS}=7.0A, V_{DD}=50V, R_G=25Ω, Starting T_J=25℃
3. I_{SD}≤7.0A, di/dt≤300A/us, VDD≤BV_{DSS}, Starting T_J=25℃
4. Pulse Test: Pulse Width ≤300us, Duty Cycle≤2%
5. Essentially independent of operating temperature
6. $R_{DS(on)}$ CP test result, typical, is 1.06Ω @V_{GS}=10V, I_D=1.0A

ELECTRICAL CHARACTERISTICS (curves)

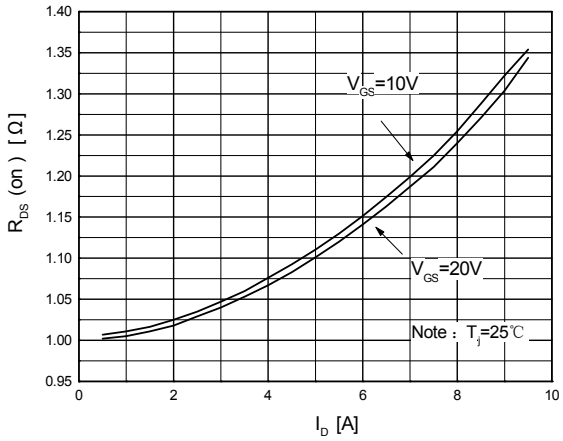
On-Region Characteristics



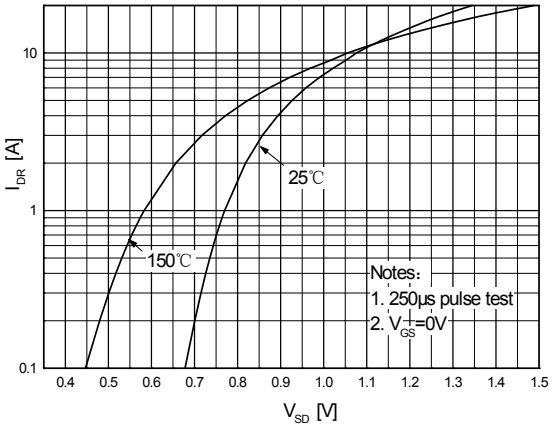
Transfer Characteristics



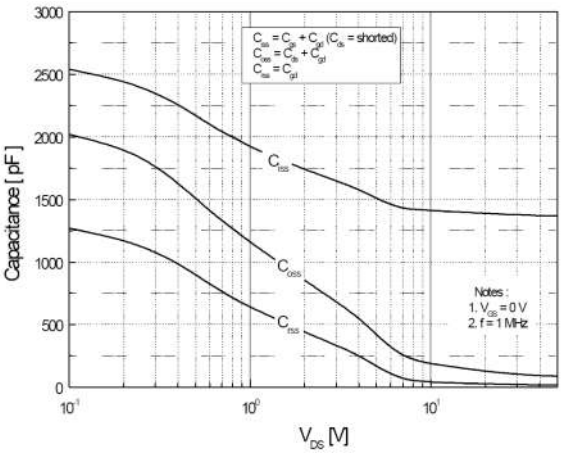
On-Resistance Variation vs. Drain Current and Gate Voltage



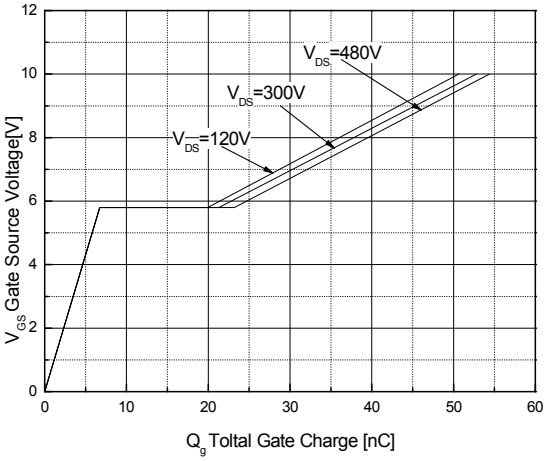
Body Diode Forward Voltage Variation vs. Source Current and Temperature



Capacitance Characteristics

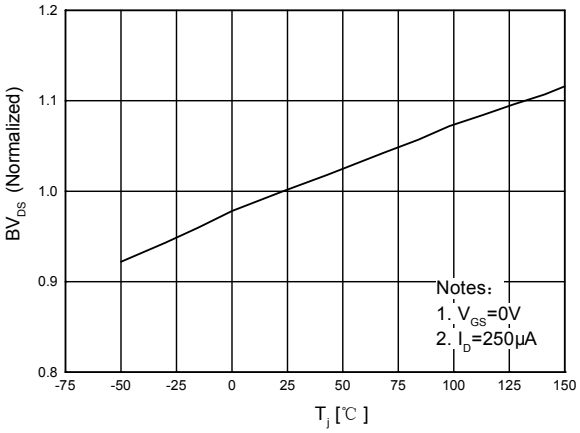


Gate Charge Characteristics

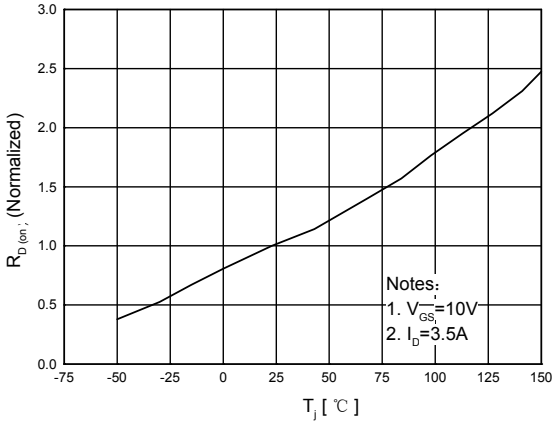


ELECTRICAL CHARACTERISTICS (curves)

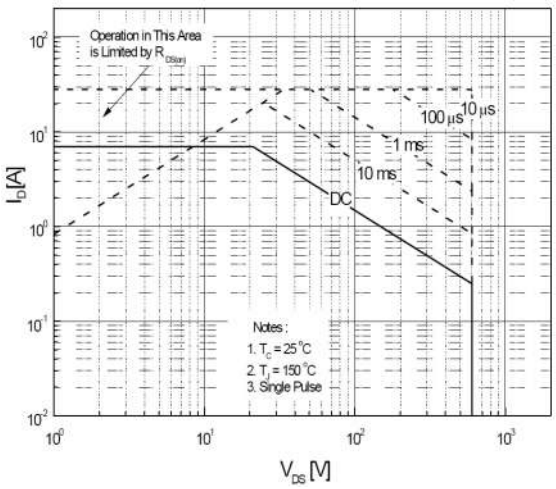
Breakdown Voltage Variation vs. Temperature



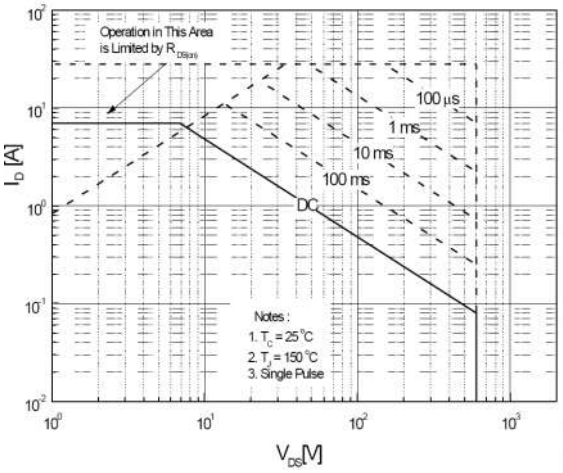
On-Resistance Variation vs. Temperature



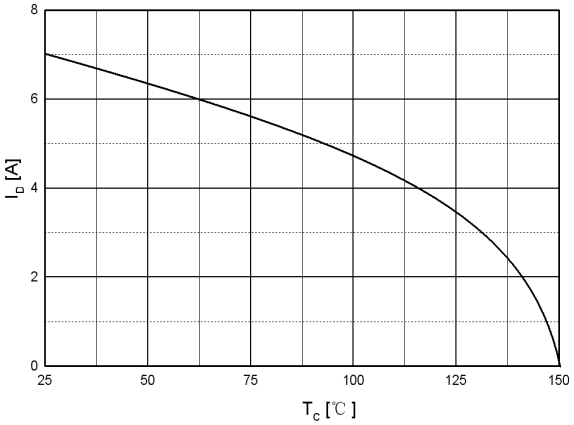
Maximum Safe Operating Area For 7N60(B)(D)



Maximum Safe Operating Area For 7N60F

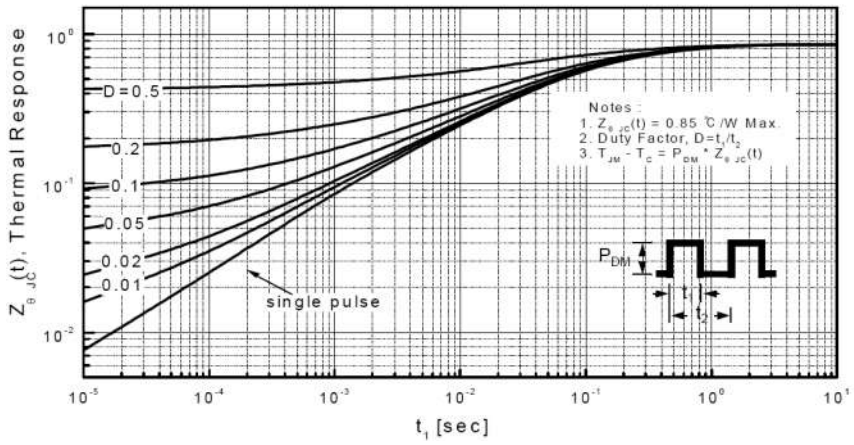


Maximum Drain Current vs. Case Temperature

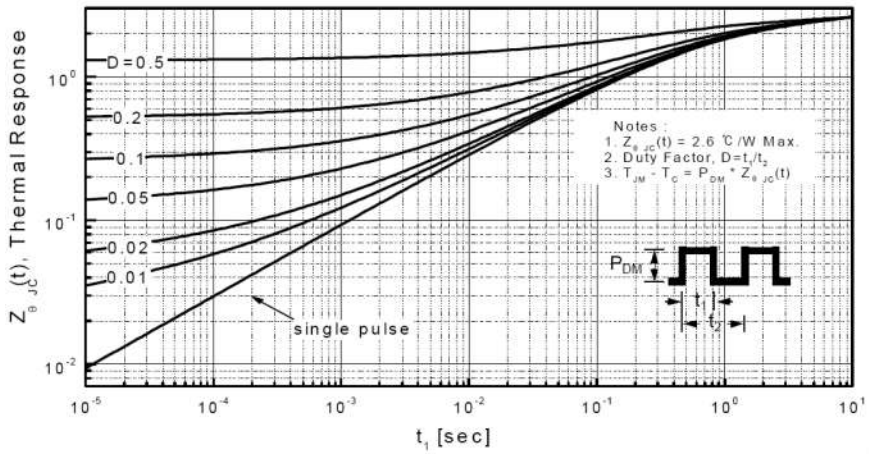


ELECTRICAL CHARACTERISTICS (curves)

Transient Thermal Response Curve For 7N60(B)(D)

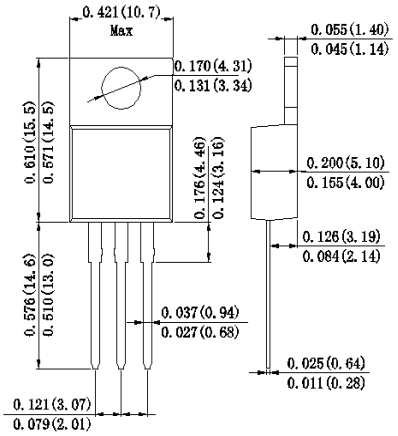


Transient Thermal Response Curve For 7N60F

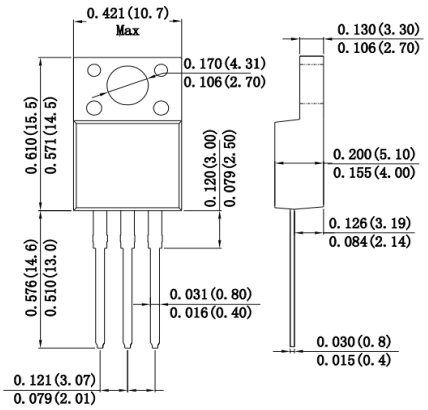


Outline Drawing

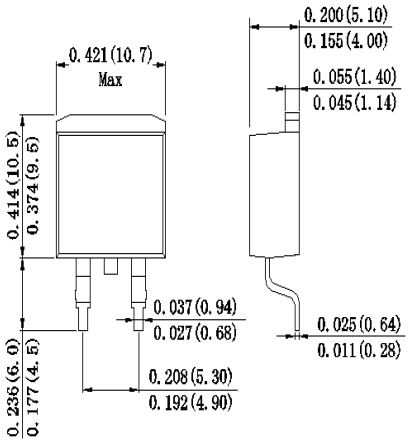
TO-220AB



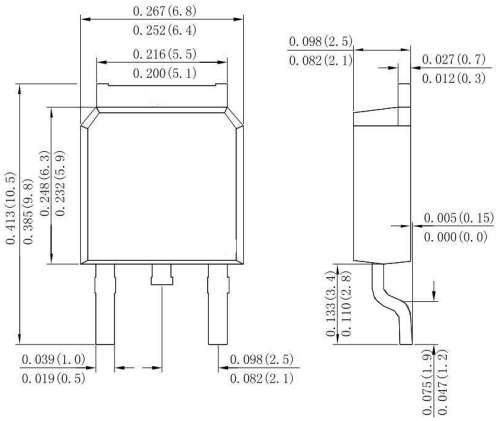
ITO-220AB



TO-263

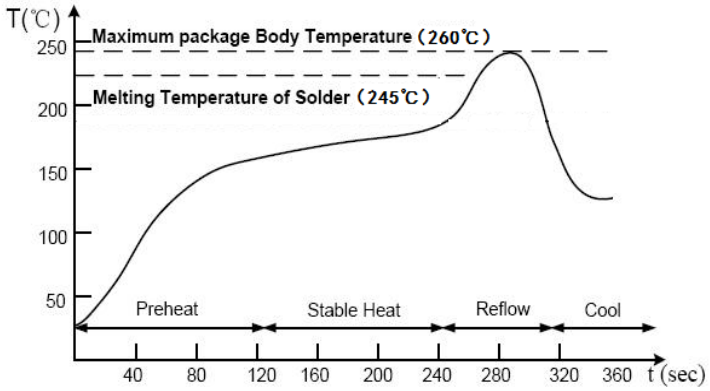


TO-252



Note: Dimensions in inches and (millimeters)

Suggested Soldering Temperature Profile



Note

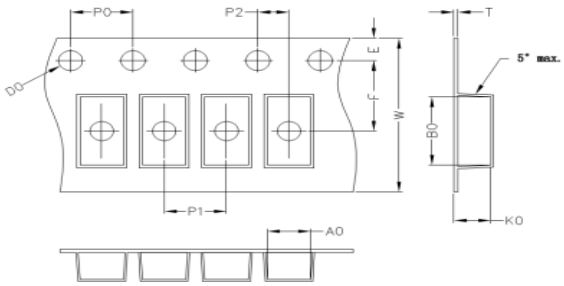
- Recommended reflow methods: IR, vapor phase oven, hot air oven, wave solder.
- The device can be exposed to a maximum temperature of 260°C for 10 seconds.
- Devices can be cleaned using standard industry methods and solvents.
- If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

Package Information

Package Specifications

Package	Tube (mm)	Q'TY/Tube (Kpcs)	Box Size (mm)	QTY/Box (Kpcs)	Carton Size (mm)	Q'TY/Carton (Kpcs)
TO-220AB	525*31.9*6.4	0.05	545*150*45	1.0	575*245*170	5.0
ITO-220AB	525*31.9*6.4	0.05	545*150*45	1.0	575*245*170	5.0

Carrier Dimension(mm)(TO-252)(TO-263)



TO-252

A0	B0	K0	D0	E	F
6.90	10.5	2.70	1.55	1.75	7.50
P0	**P1**	**P2**	**T**	**W**	**Tolerance**
4.0	8.0	2.0	0.30	16	0.1

TO-263

A0	B0	K0	D0	E	F
10.5	15.55	4.90	1.50	1.75	11.5
P0	**P1**	**P2**	**T**	**W**	**Tolerance**
4.0	16.0	2.0	0.4	24	0.1

Package	Reel Size	Reel DIA. (mm)	Q'TY/Reel (Kpcs)	Box Size (mm)	QTY/Box (Kpcs)	Carton Size (mm)	Q'TY/Carton (Kpcs)
TO-252	13'	330	2.5	340	5.0	360*360*360	40
TO-263	13'	330	0.8	340	0.8	360*360*360	6.4