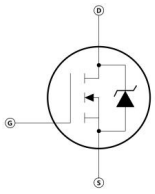
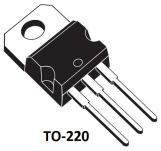
Features

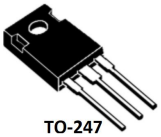
- 100% avalanche tested
- Avalanche ruggedness
- Very low intrinsic capacitances
- High speed switching
- Very low on-resistance





Applications

- Welder
- UPS
- PV Inverter
- Switching applications



Electrical ratings

Absolute maximum ratings			
Parameter	**Symbol**	**Value**	**Unit**
Drain-source voltage (V_{GS} = 0)	V_{DS}	1200	V
Gate- source voltage	V_{GS}	± 20	
Drain current (continuous) at T_C = 25 °C	I_D	6	A
Drain current (continuous) at T_c = 100 °C		3.8	
Drain current (pulsed)	I_{DM}	12	
Total dissipation at T_C = 25 °C(TO-247/TO-220)	P_{TOT}	160	W
Total dissipation at T_C = 25 °C(TO-220F)	P_{TOT}	33	W
Derating factor(TO-247/TO-220)		1.28	W/℃
Derating factor(TO-220F)		0.26	W/℃
Operating junction temperature	T_J	-55 to 175	℃
Storage temperature	T_{stg}		

Thermal data				
Parameter	**Symbol**	**Value**		**Unit**
		TO-247 TO-220	**TO-220F**	
Thermal resistance junction-case max	$R_{thj\text{-}case}$	0.78	3.79	W/℃
Thermal resistance junction-ambient max	$R_{thj\text{-}amb}$	76	84	
Maximum lead temperature for soldering purpose	T_J	300		

Avalanche characteristics			
Parameter	**Symbol**	**Max value**	**Unit**
Avalanche current, repetitive or not-repetitive (pulse width limited by T_J max)	I_{AR}	2.1	A
Single pulse avalanche energy (starting T_J = 25 °C, I_D = I_{AR}, V_{DD} = 50 V)	E_{AS}	753	mJ

Electrical Characteristics (Tvj = 25°C unless otherwise specified)

On /off states						
Parameter	**Symbol**	**Test conditions**	**Min**	**Typ**	**Max**	**Unit**
Drain-source breakdown voltage	$V_{(BR)DSS}$	I_D = 1 mA, V_{GS} = 0	1200			V
Zero gate voltage drain current (V_{GS} = 0)	I_{DSS}	V_{DS} = Max rating V_{DS}=Max rating, T_C=125 °C			66	μA
Gate-body leakage current (V_{DS} = 0)	I_{GSS}	V_{GS} = ± 30 V			± 100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	3	4	5	V
Static drain-source on resistance	$R_{DS(on)}$	V_{GS} = 10V, I_D = 4A		5.5	7	Ω

Dynamic						
Parameter	**Symbol**	**Test conditions**	**Min**	**Typ**	**Max**	**Unit**
Forward transconductance	g_{fs}	V_{DS} = 15 V, I_D = 4		5.7		S
Input capacitance	C_{iss}	V_{DS}=25V,f=1MHz,V_{GS}=0		2310		pF
Output capacitance	C_{oss}			330		
Reverse transfer capacitance	C_{rss}			80		
Equivalent Output capacitance	$C_{oss\ eq.}$	V_{GS}=0,V_{DS}=0 to 1200V		120		
Gate input resistance	R_g	f=1MHz Gate DC Bias=0 Test signal level=20mV open drain		2.2		Ω
Total gate charge	Q_g	V_{DD}=1200V,I_D=8A V_{GS}=10V		85		nC
Gate-source charge	Q_{gs}			14		
Gate-drain charge	Q_{gd}			48		

Switching times						
Parameter	**Symbol**	**Test conditions**	**Min**	**Typ**	**Max**	**Unit**
Turn-on delay time	$t_{d(on)}$	V_{DD} = 750 V, I_D = 4 A,		33		ns

Rise time	t_r	R_G = 4.7 Ω, V_{GS} = 10 V		26		
Turn-off-delay time	$t_{d(off)}$			46		
Fall time	t_f			21		

Source drain diode

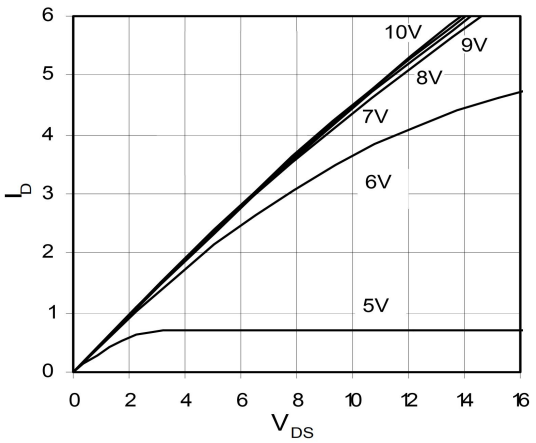
Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Source-drain current	I_{SD}			6		A
Source-drain current (pulsed)	I_{SDM}			12		
Forward on voltage	V_{SD}	I_{SD}= 6A, V_{GS}= 0		1.5		V
Reverse recovery time	t_{rr}	I_{SD}= 6A, di/dt= 100A/μs V_{DD}= 60 V		360		nS
Reverse recovery charge	Q_{rr}			5.3		μ C
Reverse recovery current	I_{RRM}			19		A
Reverse recovery time	t_{rr}	I_{SD}=6A, di/dt=100A/μs V_{DD}= 60V T_J=150°C		520		nS
Reverse recovery charge	Q_{rr}			7.6		μ C
Reverse recovery current	I_{RRM}			17		A

Order information

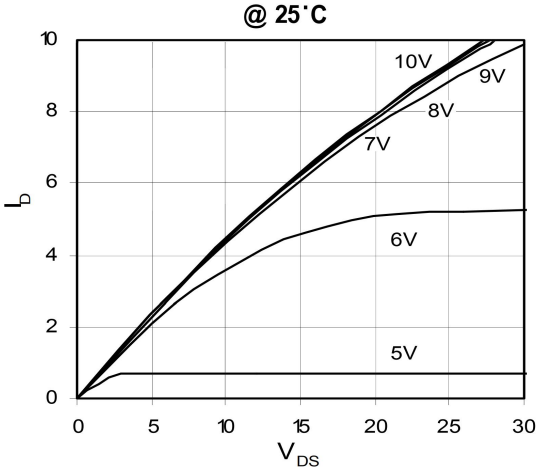
MS6N120FS	TO-220F	Tube	
MS6N120FT	TO-220	Tube	
MS6N120FC	TO-247	Tube	

Electrical characteristics

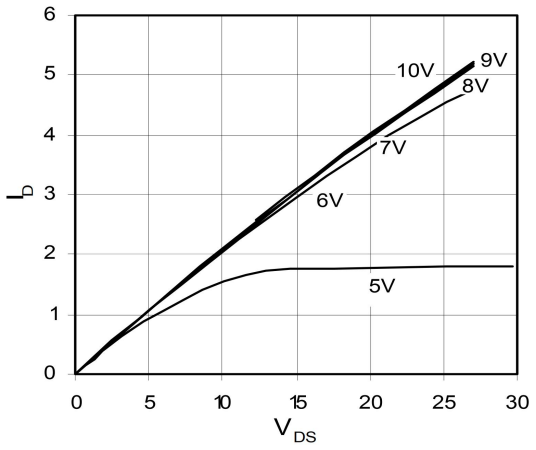
1. Output Characteristics @ 25˚C



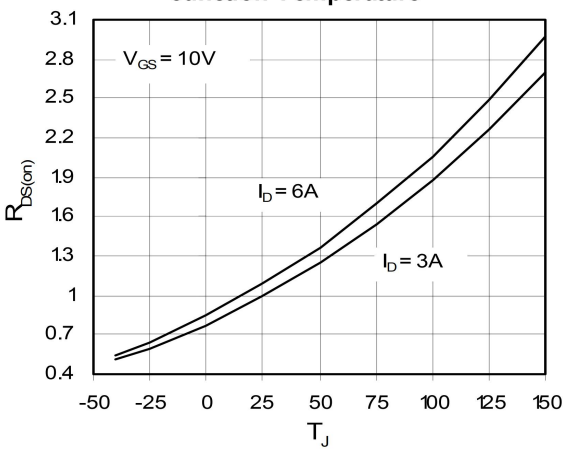
2. Extended Output Characteristics @ 25˚C



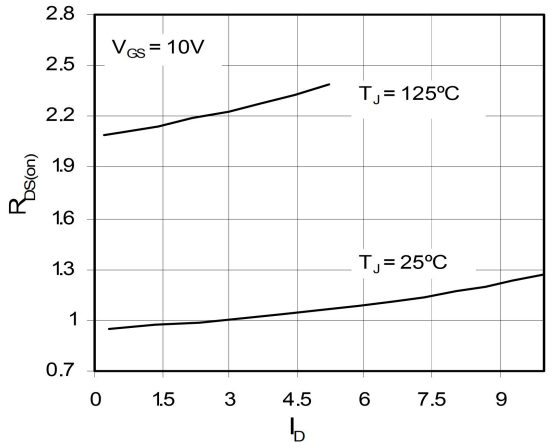
3. Output Characteristics @ 125˚C



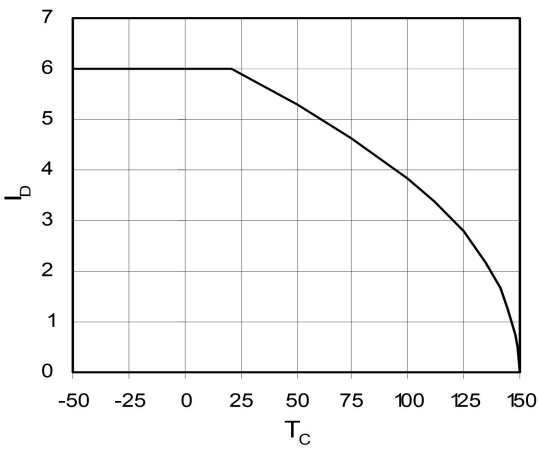
4. $R_{DS(on)}$ Normalized to I_D Value vs. Junction Temperature



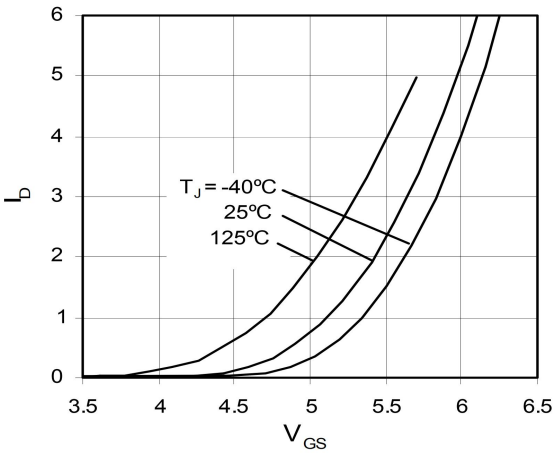
5. $R_{DS(on)}$ Normalized to I_D Value vs. I_D



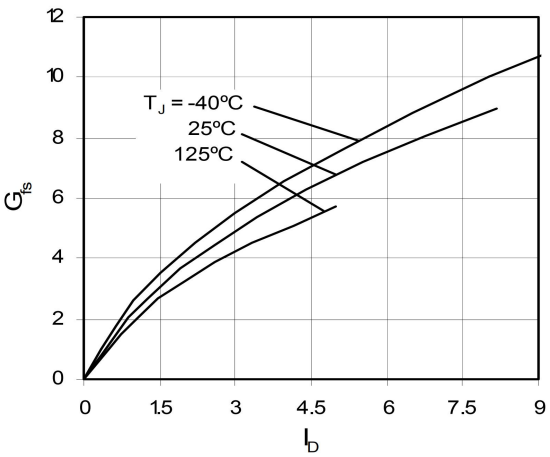
6. Drain Current vs. Case Temperature



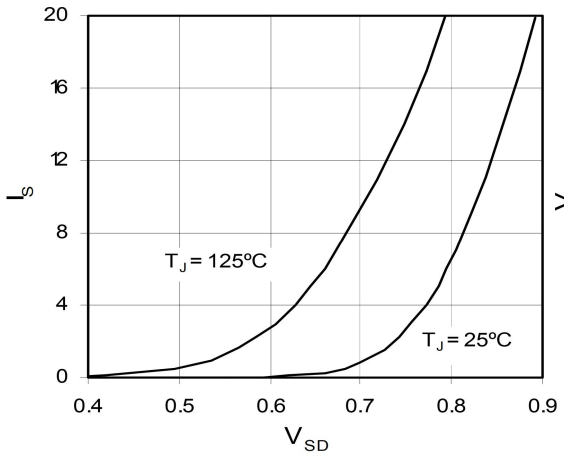
7. Input Admittance



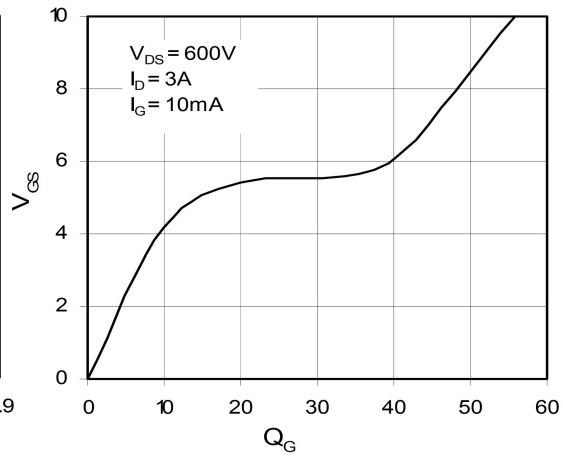
8. Transconductance



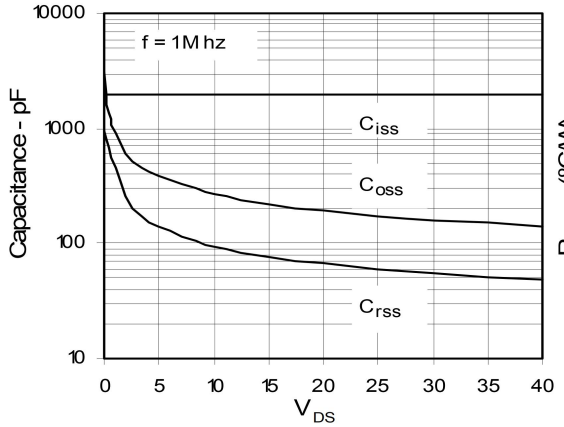
9. Source Current vs. Source-To-Drain



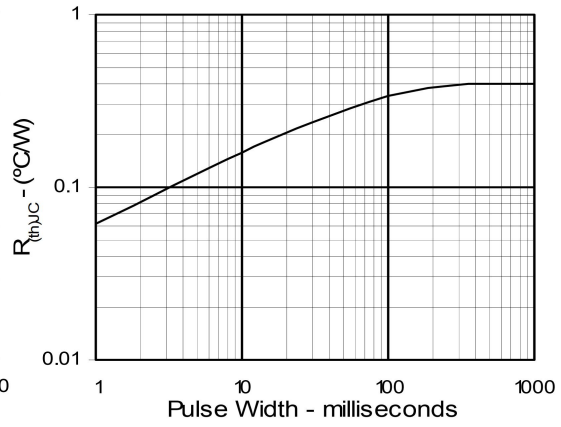
10. Gate Charge



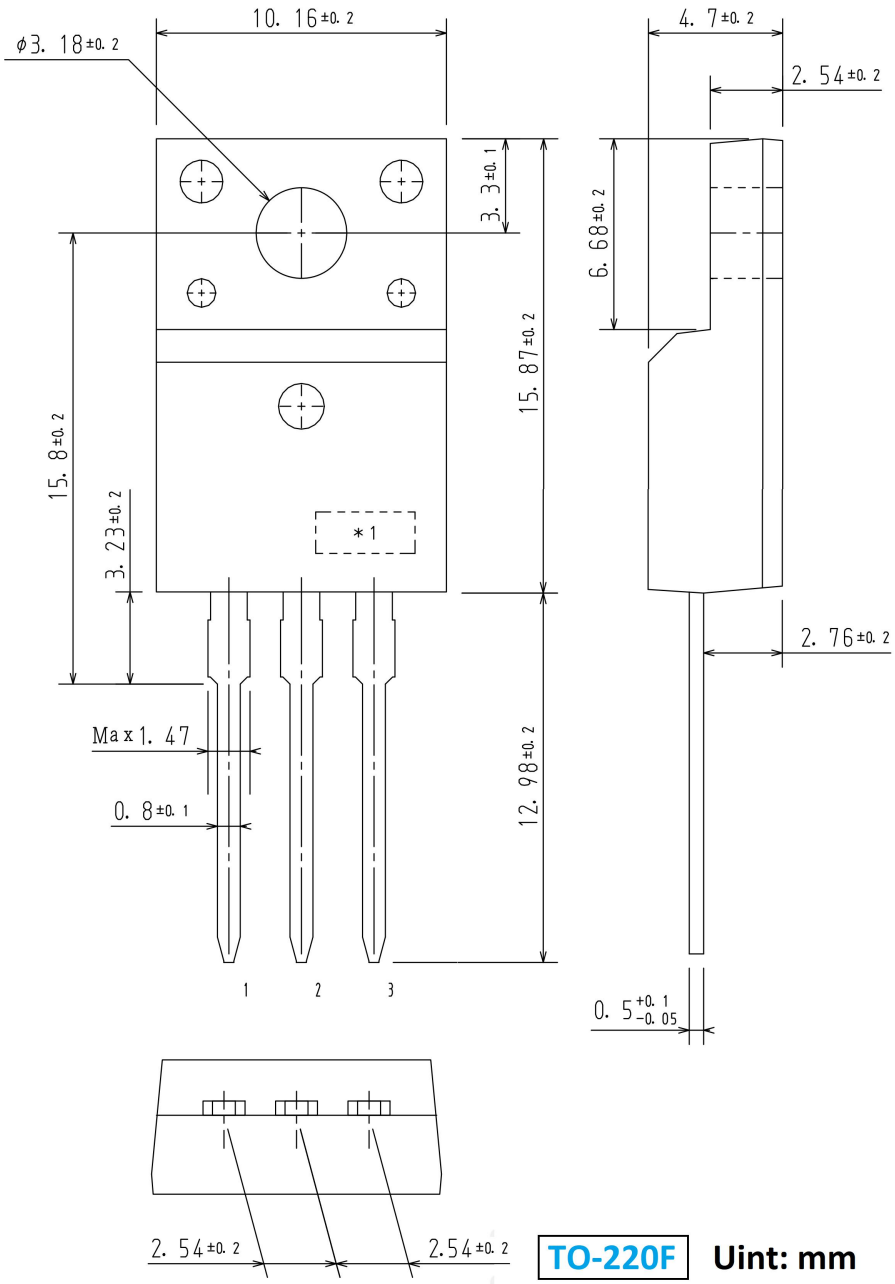
11. Capacitance



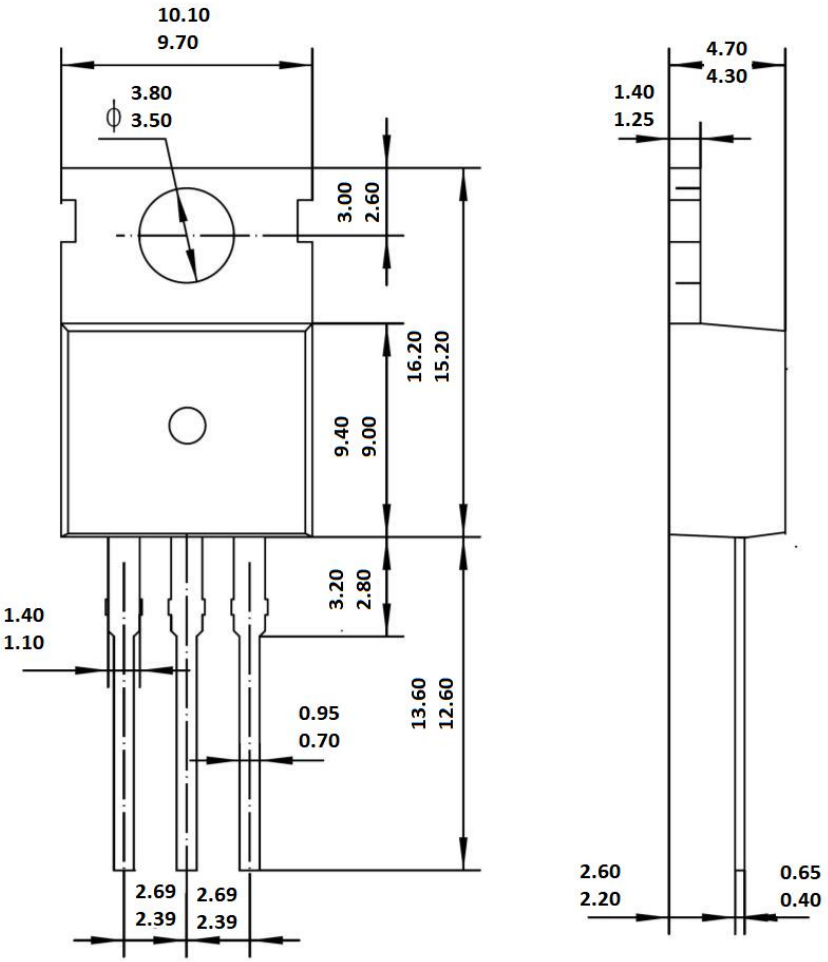
12. Maximum Transient Thermal Resistance



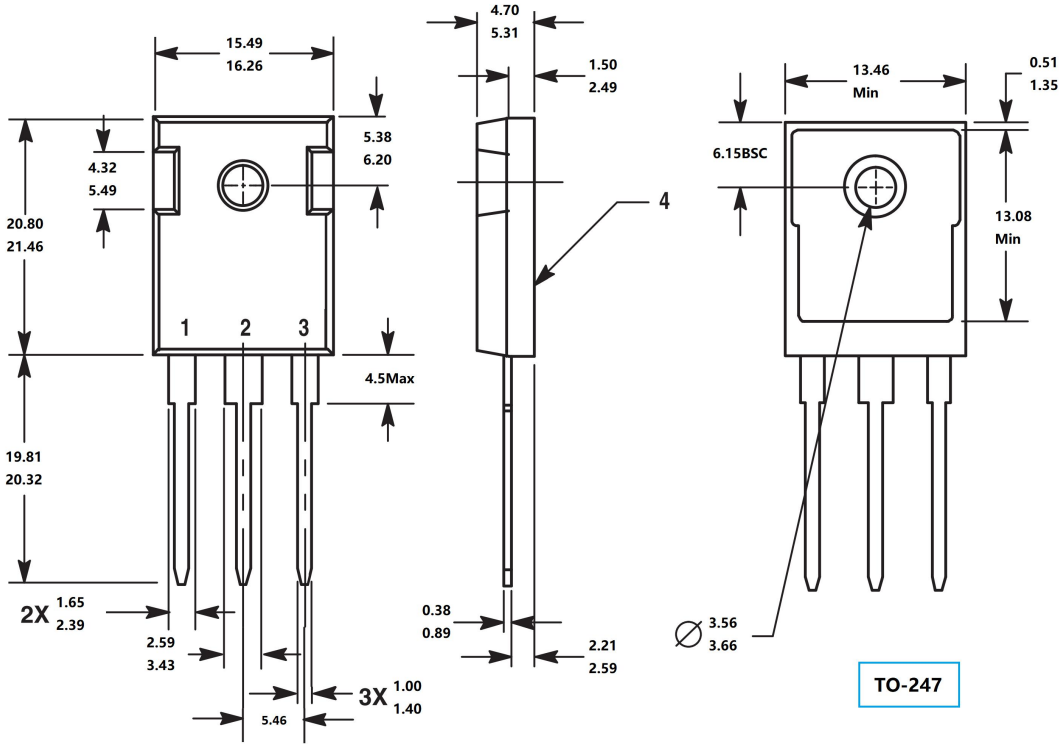
Package outline dimension



TO-220F **Uint: mm**



TO-220 **Unit: mm**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16.26
4.70
5.31
1.50
2.49
13.46
Min
0.51
1.35
5.38
6.20
4.32
5.49
6.15BSC
20.80
21.46
4
13.08
Min
1
2
3
4.5Max
19.81
20.32
2X 1.65
2.39
2.59
3.43
0.38
0.89
2.21
2.59
∅ 3.56
3.66
3X 1.00
1.40
5.46
TO-247