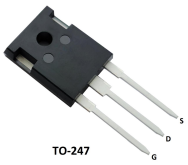
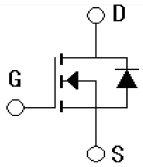
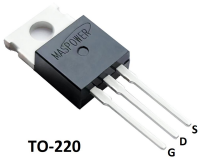
MS20N85ICC0/T0/T1

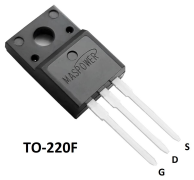
Features

- Very low FOM $R_{DS(on)}$×Qg
- 100% avalanche tested
- Easy to use/drive
- RoHS compliant









Applications

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)
- Low Power Chargers and Adapters

Absolute Ratings (Tc=25℃, unless otherwise noted)

Parameter	Symbol		Value	Unit
Drain-Source Voltage	V_{DSS}		850	V
Transient Gate-Source Voltage	V_{GSM}		±30	V
Continuous Gate-Source Voltage	V_{GSS}		±20	V
Drain Current-continuous	I_D	T_C=25℃	20	A
		T_C=100℃	10	A
Drain Current-pulse (note 1)	I_{DM}		80	A
Single Pulsed Avalanche Energy (note 2)	E_{AS}		1125	mJ
Repetitive Avalanche Energy(note 2)	E_{AR}		27.8	mJ
Avalanche Current	I_{AR}		4.6	A
MOSFET dv/dt Ruggedness, VDS = 0...480V	dv/dt		50	V/ns
Continuous Diode Forward Current	I_S		20	A
Diode Pulsed Current(note 1)	$I_{S,pulse}$		69	A
Reverse Diode dv/dt(note 3)	dv/dt		15	V/ns
Maximum Diode Commutation Speed(note 3)	di/dt		500	A/μs
Power Dissipation (TO-247/TO-220)	PD		183	W
Power Dissipation (TO-220F)	PD		67	W

Operating and Storage Temperature Range	T_J,T_{STG}	-55~+150	℃

Electrical Characteristics(T_{CASE}=25℃ unless otherwise specified)

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Drain-Source Voltage	BV_{DSS}	I_D=250μA,V_{GS}=0V	850	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=V_{DSS},V_{GS}=0V	-	-	1	μA
		V_{DS}=V_{DSS}, VGS=0V,T_C=150℃	-	-	100	μA
Gate body leakage current	I_{GSS}	V_{DS}=0V,V_{GS}=±20V	-	-	±100	nA
On-Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	2.5	-	4.5	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V,I_D=4A	-	0.58	0.68	Ω
Gate Resistance	R_G	f = 1.0MHz open drain	-	5.96	-	Ω
Dynamic Characteristics						
Input capacitance	C_{iss}	V_{DS}=100V, V_{GS}=0V, f=250kHz	-	870.4	-	pF
Output capacitance	C_{oss}		-	28.65	-	pF
Reverse transfer capacitance	C_{rss}		-	0.80	-	pF

Electrical Characteristics(T_{CASE}=25℃ unless otherwise specified)

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Switching-Characteristics						
Turn-On delay time	$t_{d(on)}$	V_{DD}=400V,I_D=20A, R_G=25Ω	-	68.45	-	ns
Turn-On rise time	t_r		-	76.9	-	ns
Turn-Off delay time	$t_{d(Off)}$		-	180.2	-	ns
Turn-Off rise time	t_f		-	58.35	-	ns
Total Gate Charge	Q_g	V_{DS}=640V,I_D=20A, V_{GS}=10V	-	54.9	-	nC
Gate-Source charge	Q_{gs}		-	10.4	-	nC

Gate-Drain charge	Q_{gd}		-	21.5	-	nC
Drain-Source Diode Characteristics and Maximum Ratings						
Source-Drain Voltage(Body Diode)	V_{SD}	T_C=25℃,I_S=10A	-	-	1.2	A
Reverse recovery time	t_{rr}	V_R=400,I_F=20A dI_F/dt=100A/μs	-	405.4	-	ns
Reverse recovery charge	Q_{rr}		-	4.633	-	μC
Peak Reverse Recovery Current	I_{rrm}		-	22.83	-	A

Thermal Characteristic

Parameter	Symbol	Value		Unit
		TO-247/ TO-220	TO-220F	
Thermal Resistance,junction to Case,Max	R_{th}(j-C)	0.68	1.84	℃/W
Thermal Resistance,junction to Ambient,Max	R_{th}(j-A)	62.5	62.5	℃/W

Notes:

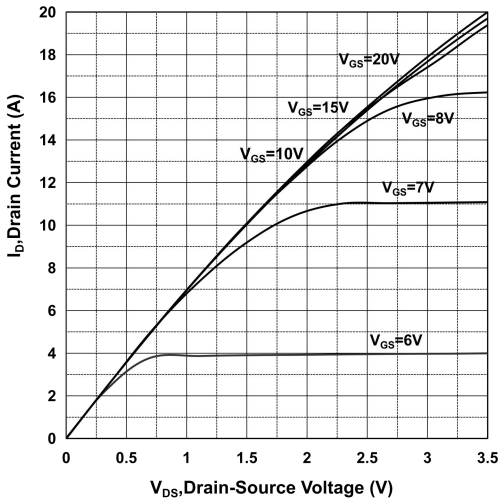
1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. I_D = 10A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
3. Identical low side and high side switch with identical R_G

Order information

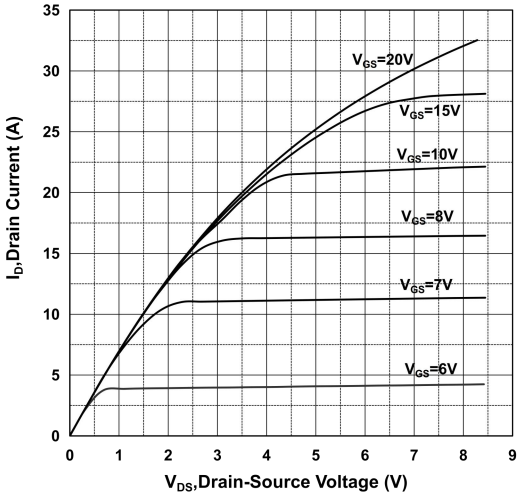
Order codes	Package	Packaging
MS20N85ICC0	TO-247	Tube
MS20N85ICT0	TO-220	Tube
MS20N85ICT1	TO-220F	Tube

Typical Characteristics

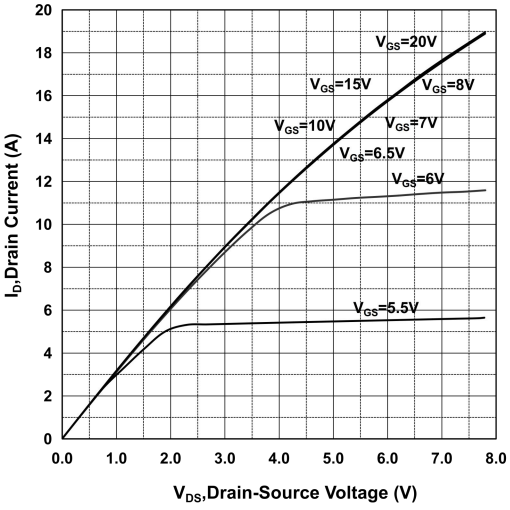
On-Region Characteristic@25℃



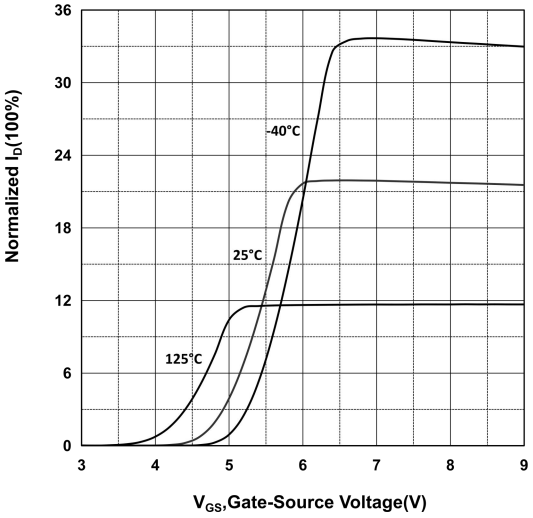
Extended On-Region Characheristic@25℃



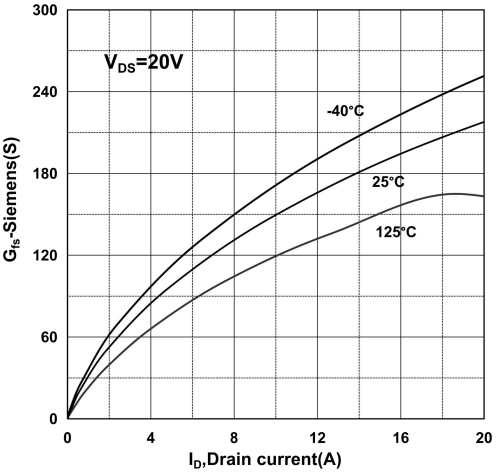
On-Region Characteristic@125℃



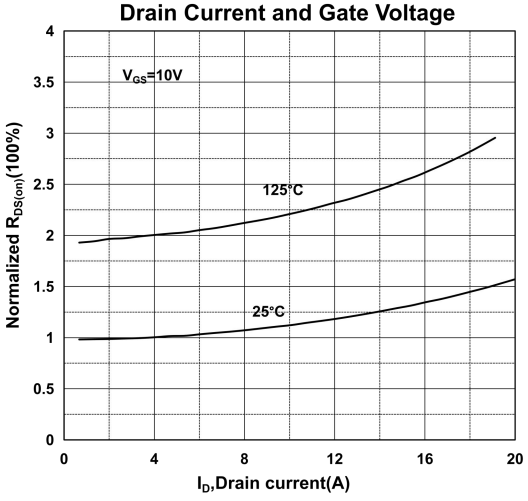
Normalized Transfer Characteristics



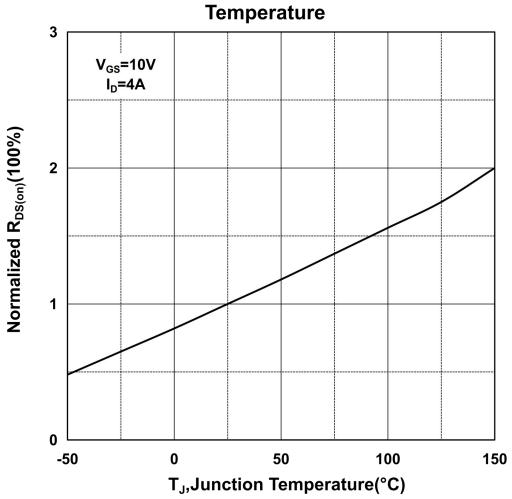
Transconductance



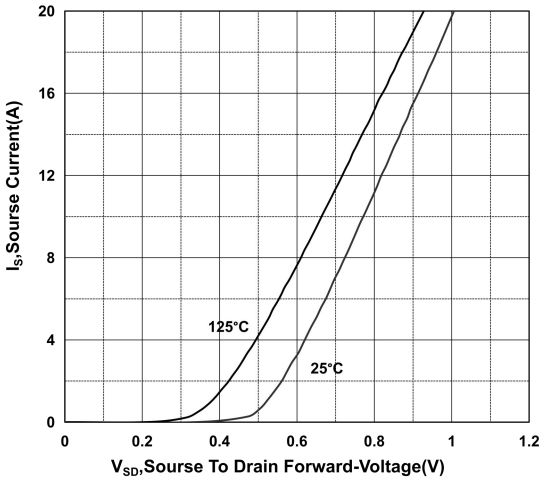
Normalized On-Resistance Variation vs Drain Current and Gate Voltage



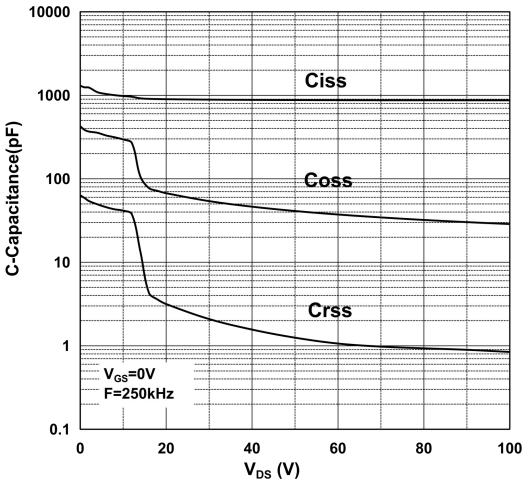
Normalized On-Resistance Variation vs Temperature



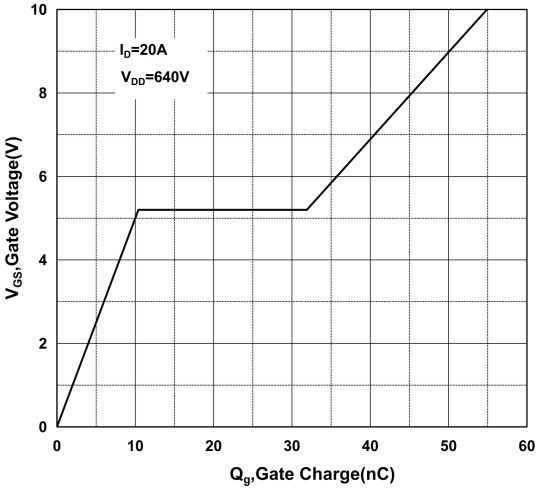
Body Diode Forward Voltage Variation with Sourse Current and Temperature



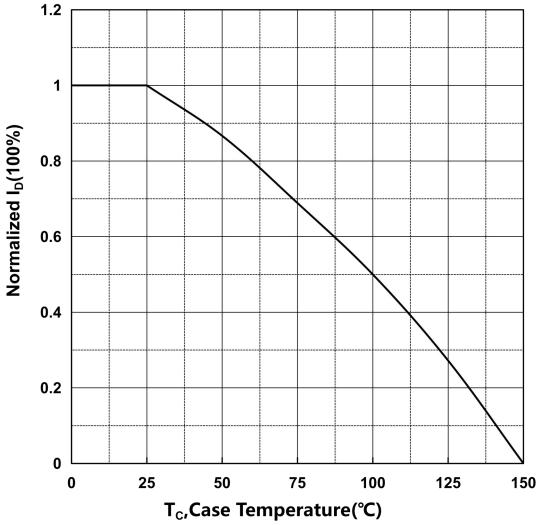
Capacitance



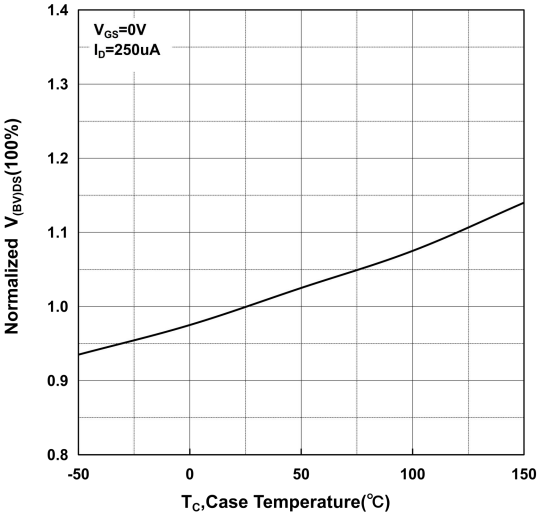
Gate Charge



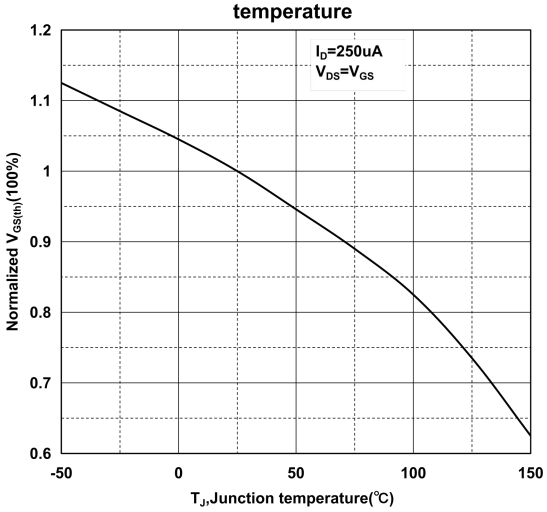
Normalized Maximum Drain Current vs Case Temperature



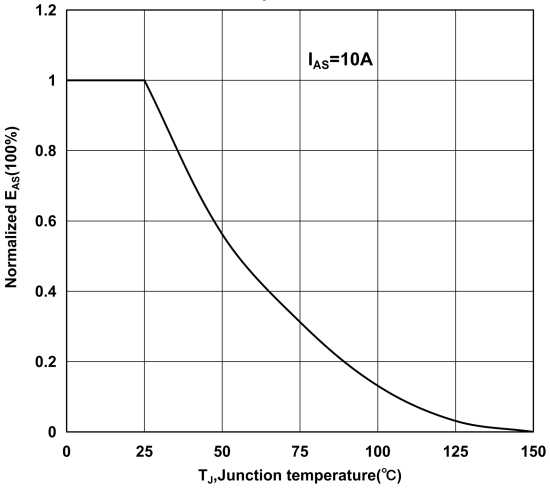
Normalized $V_{(BV)DS}$ vs temperature



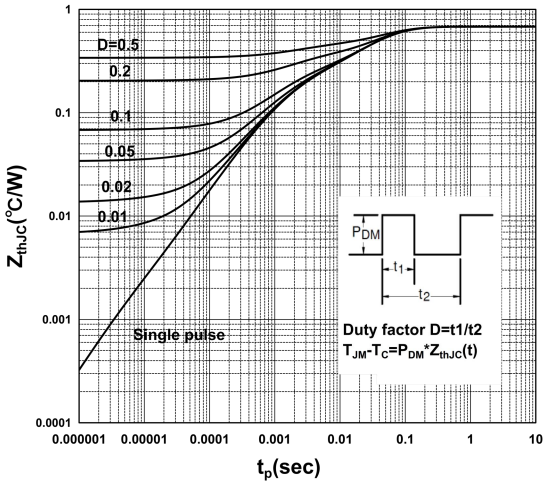
Normalized gate threshold voltage vs temperature



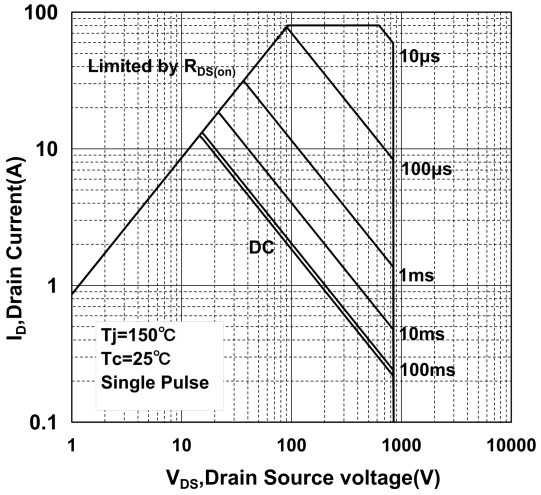
Normalized Maximum avalanche energy vs temperature



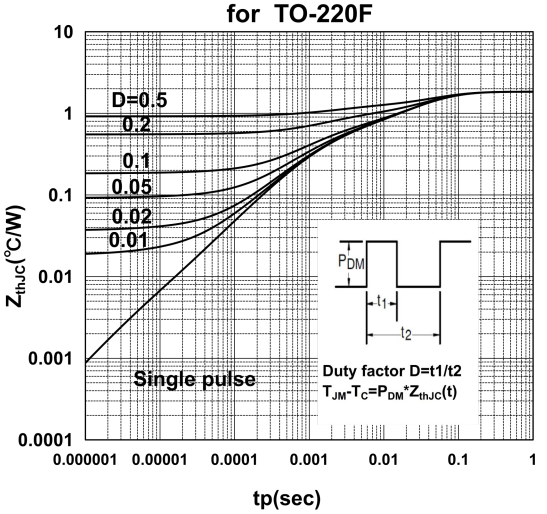
Transient Thermal Response Curve for TO-247/TO-220



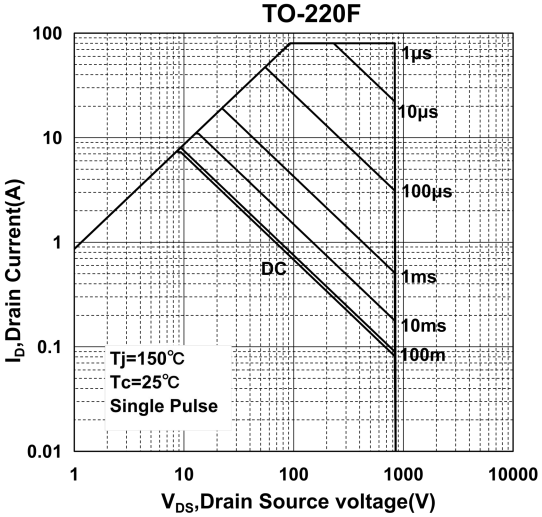
Safe Operating Area for TO-247/TO-220



Transient Thermal Response Curve for TO-220F

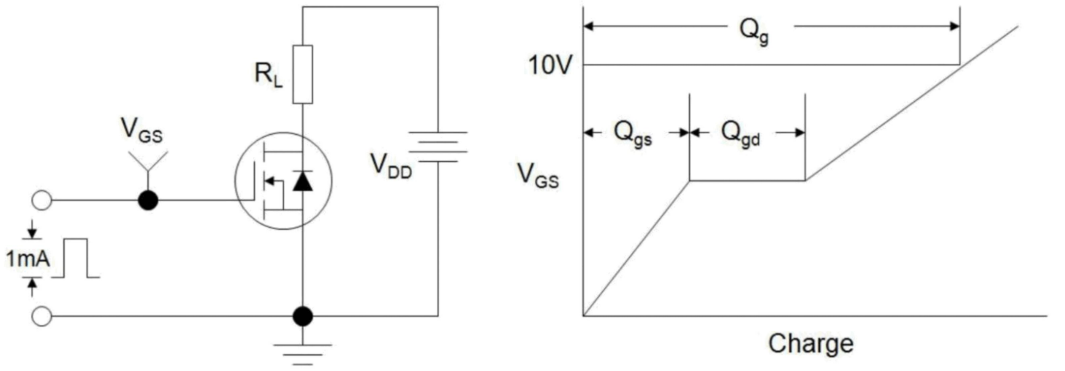


Safe Operating Area for TO-220F

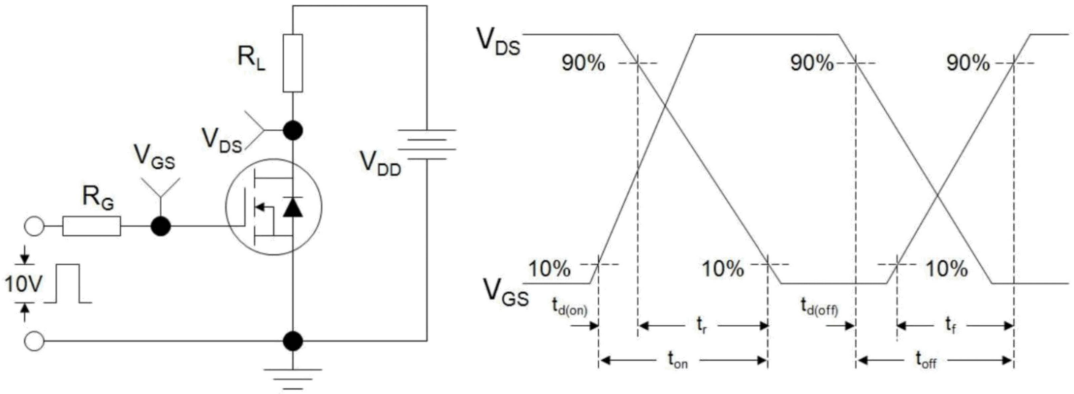


Test Circuit

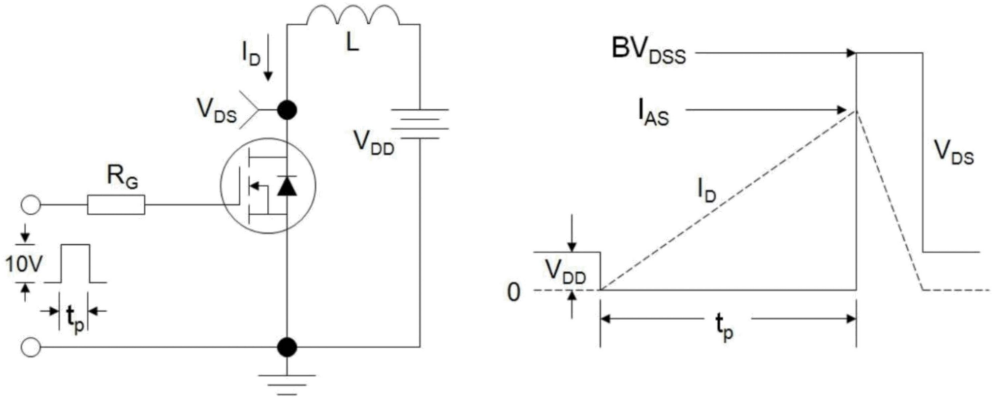
Gate Charge Test Circuit and Waveform



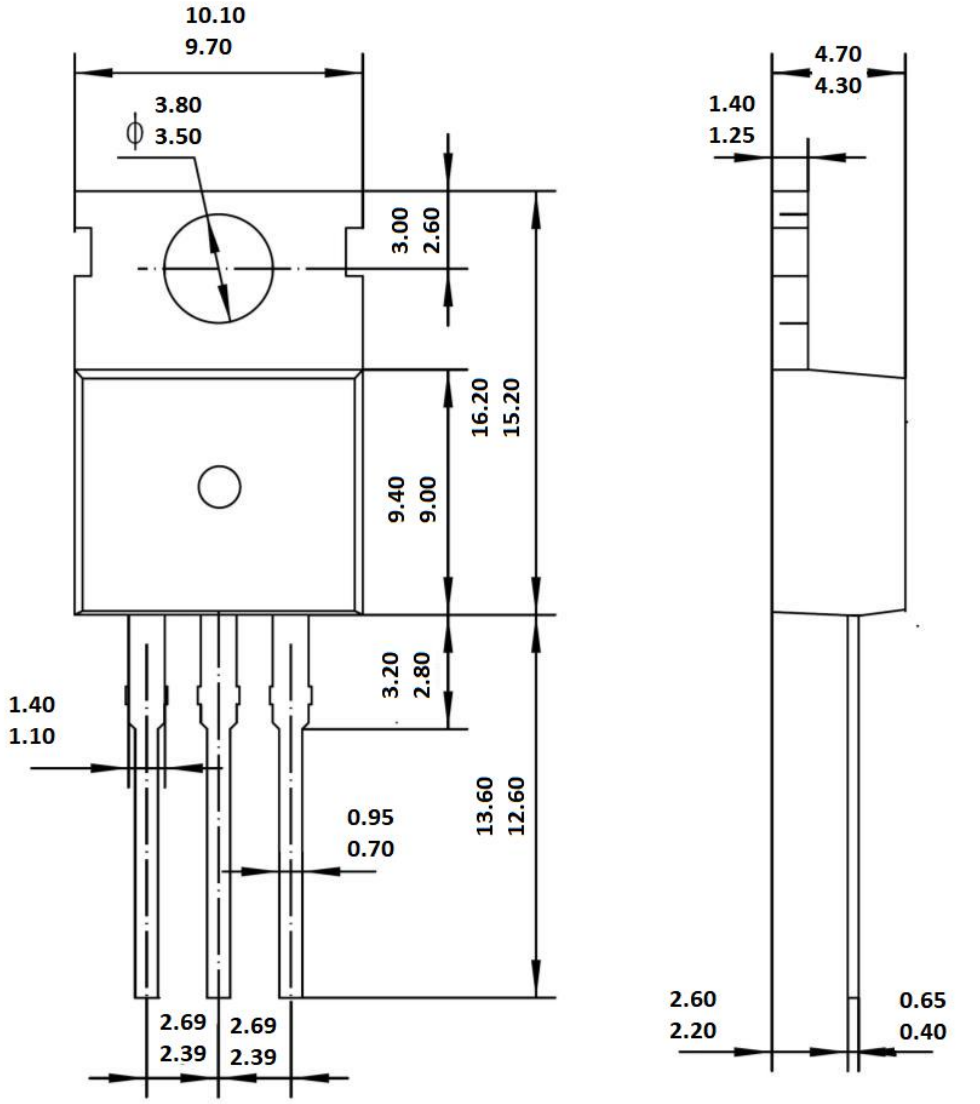
Resistive Switching Test Circuit and Waveform

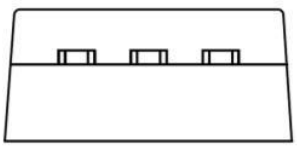


Unclamped Inductive Switching Test Circuit and Waveform



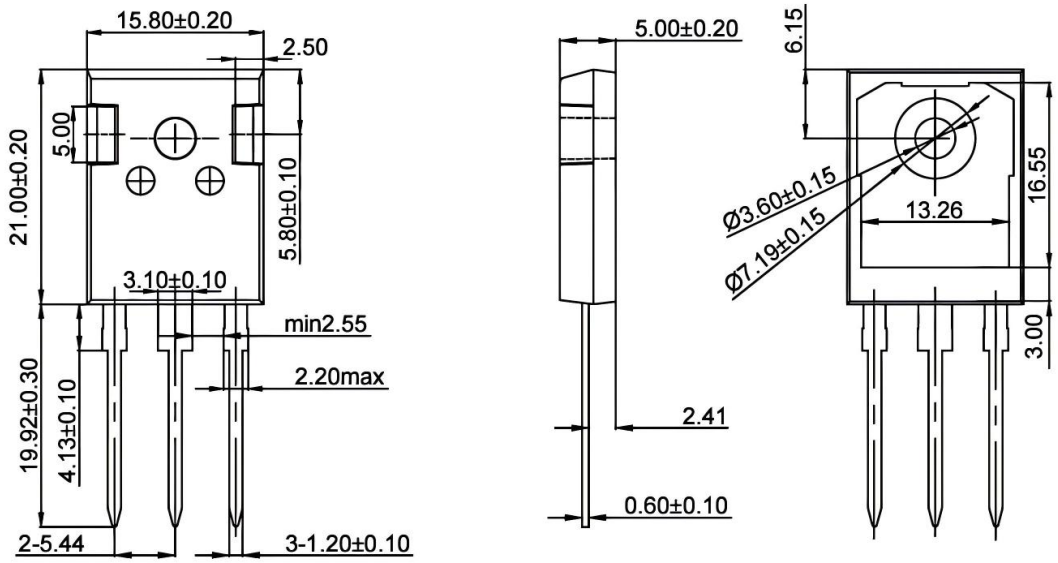
Package Mechanical DATA





TO-220

Unit: mm



NOTES:1.surface roughness Ra =1.14±0.20um
2.Unmarked tolerance ±0.15
3.unit:mm

