I3GT022N10

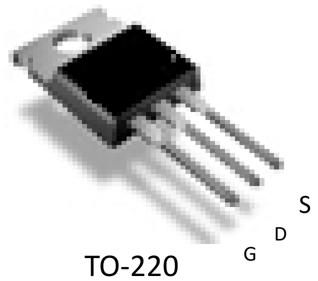
100V N-Channel Power MOSFET

Product Summary

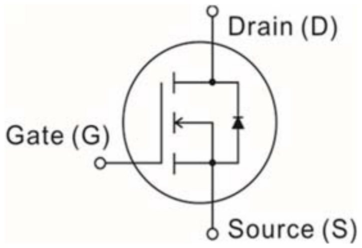
Parameter	Value	Unit
V_{DS} @ Tjmax	100	V
$R_{DS(on),max}$ @ V_{GS} = 10 V	2.2	mΩ
I_D @ V_{GS} = 10 V	260	A
P_{tot}	375	W

Features

- * Low on-resistance
- * Low gate threshold voltage
- * Excellent FOM



TO-220



Application

- * Synchronous rectification
- * BMS battery protection
- * DC/AC inverter
- * DC/DC converter

Maximum ratings T_A = 25℃ unless otherwise noted

Parameter		Symbol	Limit	Unit
Drain - source voltage		V_{DS}	100	V
Continuous drain current	T_C @ 25℃	I_D	260	A
	T_C @ 100℃		180	
Pulsed drain current tp limited by Tj max (Note 1)	T_C @ 25℃	I_D pulsed	480	A
Single pulse avalanche energy (Note 2)		E_{AS}	1080	mJ
Gate-source voltage		V_{GS}	± 20	V
Power dissipation	T_C @ 25℃	P_{tot}	375	W
Storage temperature range		T_{STG}	- 55 to +175	℃
Operating junction temperature range	T_C @ 25℃	T_J	- 55 to +175	℃

Electrical characteristics T_A = 25℃ unless otherwise specified						
Parameter	**Test Conditions**	**Symbol**	**Min.**	**Typ.**	**Max.**	**Units**
Off characteristics						
Drain-source breakdown voltage	V_{GS} = 0V, I_D = 1mA	BV_{DSS}	100	---	---	V
Gate-source leakage	V_{GS} = ± 20V, V_{DS}=0V	I_{GSS}	---	---	± 100	nA
Zero gate voltage drain current	V_{DS}= 100V, V_{GS}= 0V, Tj=25℃	I_{DSS}	---	0.1	1	uA
	Tj=125℃		---	---	100	
On characteristics						
Drain-source on-state resistance	V_{GS} = 10V, I_D = 100A, Tj=25℃	$R_{DS(on)}$	---	1.8	2.2	mΩ
Gate-source threshold voltage	V_{DS} = V_{GS}, I_D = 250uA	$V_{GS(th)}$	2.0	3.0	4.0	V
Gate resistance	F = 1MHz, open drain	R_G	---	1.2	---	Ω
Dynamic and switching characteristics-						
Gate-source charge	V_{DD} = 50V, I_D = 100A V_{GS} = 0 to 10V	Q_{gs}	---	53	---	nC
Gate-drain charge		Q_{gd}	---	31	---	
Gate charge total		Q_g	---	155	---	
Turn-on delay time	V_{DD} = 50V, I_D = 100A V_{GS} = 10V, $R_{G,ext}$ = 1.6Ω	Td(on)	---	44	---	ns
Rise time		Tr	---	36	---	
Turn-off delay time		Td(off)	---	81	---	
Fall time		Tf	---	22	---	
Input capacitance	V_{GS} = 0V, V_{DS} = 50V , F = 1MHz	C_{iss}	---	11100	---	pF
Output capacitance		C_{oss}	---	1730	---	
Reverse transfer capacitance		C_{rss}	---	45	---	

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Units
Drain-source diode characteristics and maximum ratings						
Inverse diode forward voltage	I_S = 100A, V_{GS} = 0V	V_{SD}	---	0.9	1.2	V
Reverse recovery time	V_R = 50V, I_F = 100A, di_F / dt = 100A / uS	t_{rr}	---	95	---	ns
Reverse recovery charge		Q_{rr}	---	295	---	nC

Notes:

1. **Repetitive rating : pulsed width limited by maximum junction temperature.**
2. **V_{DD}=50V, starting Tj=25℃.**

Thermal characteristics			
Thermal resistance junction-to-case	R_{thJC}	0.4	℃ / W
Thermal resistance junction-to-ambient	R_{thJA}	62	

Package Marking and Ordering Information

Type / Ordering Code	Package	Packaging	Related Links
I3GT022N10	TO-220	Tube	see Package outline

Electrical characteristics diagrams

Fig 1: Power dissipation

$P_{tot} = f\ (T_C)$

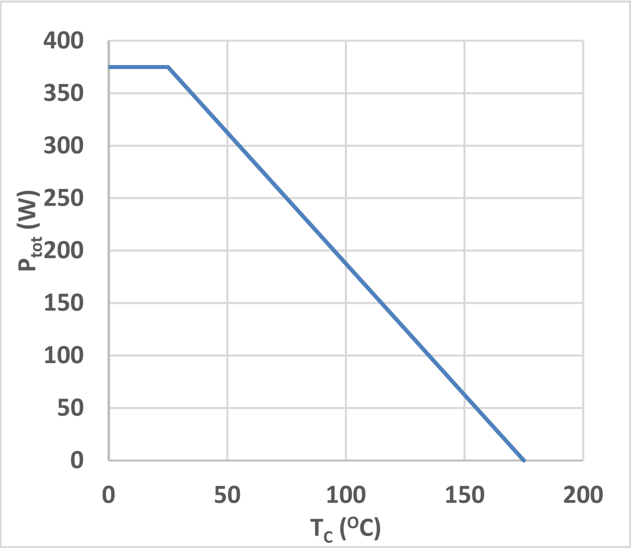


Fig 2: Safe operating area

$I_D = f\ (V_{DS})$; parameter : D = 0, T_C = 25℃

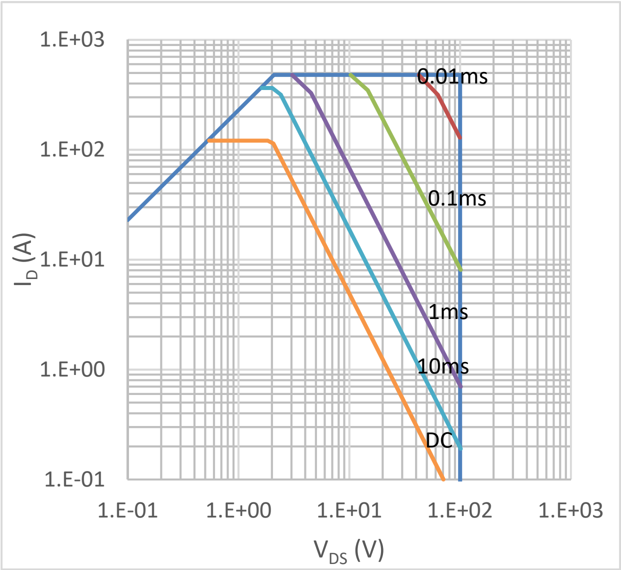


Fig 3: Transient thermal impedance

Z_{thJC} = f (tp); parameter : D = tp / T

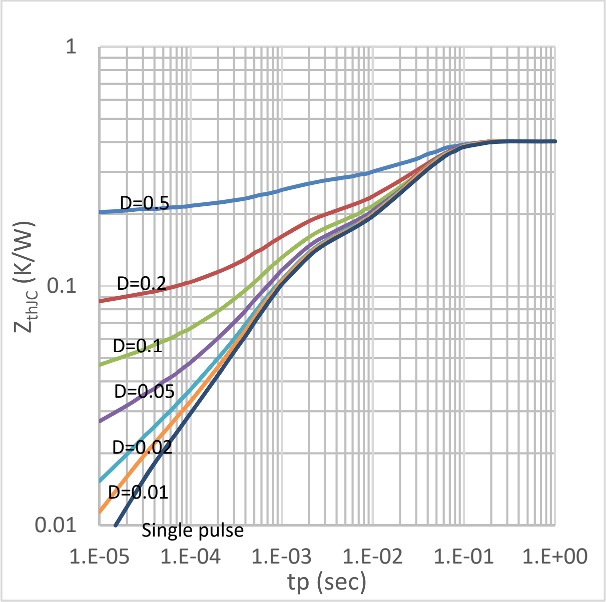


Fig 4: Typ. output characteristics

I_D = f (V_{DS}) ; Tj = 25℃; parameter: V_{GS}

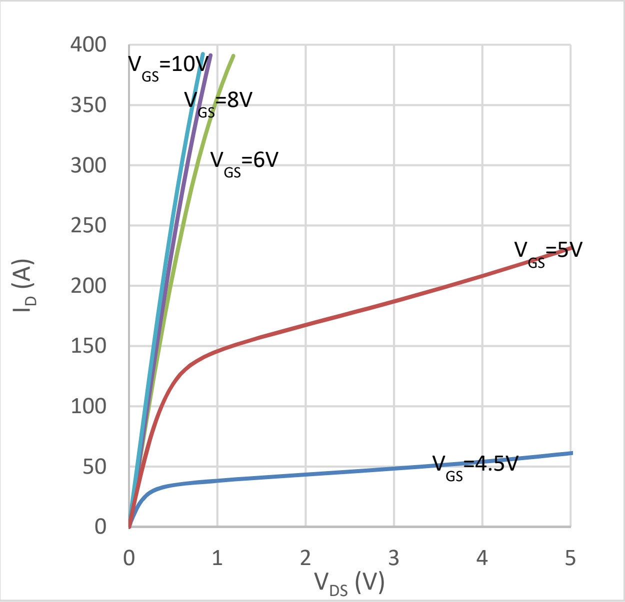


Fig 5: Drain current

I_D = f (T_C) ; V_{GS} >= 10V

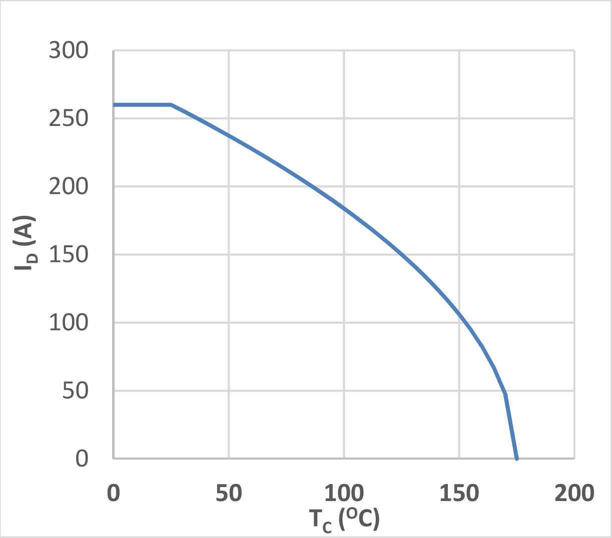


Fig 6: Typ. Drain source on-resistance

$R_{DS(on)}$ = f (I_D); parameter : tp = 50uS, Tj = 25℃, V_{GS}

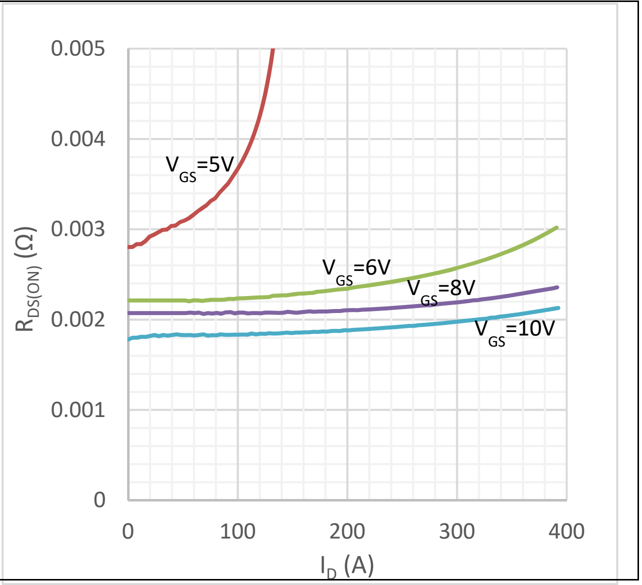


Fig 7: Drain-source on-state resistance

$R_{DS(on)}$= Tj ; parameter : I_D = 100A, V_{GS} = 10V

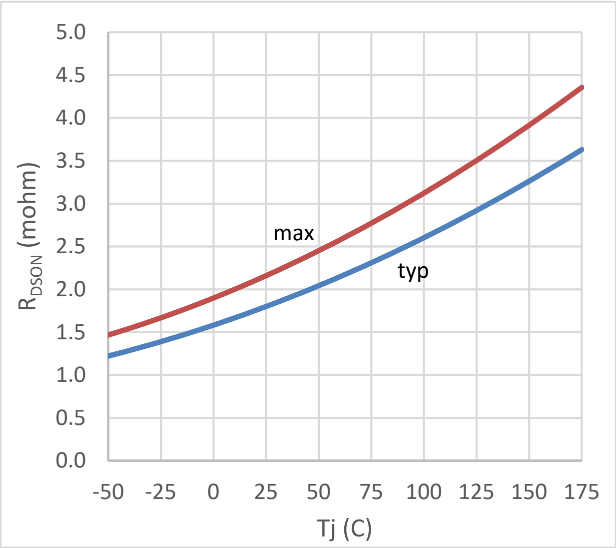


Fig 8: Typ. transfer characteristics

I_D = f (V_{GS}); V_{DS} ≧2 X I_D X $R_{DS(on)\ max}$; Tj = 25℃;
parameter : tp = 50 uS

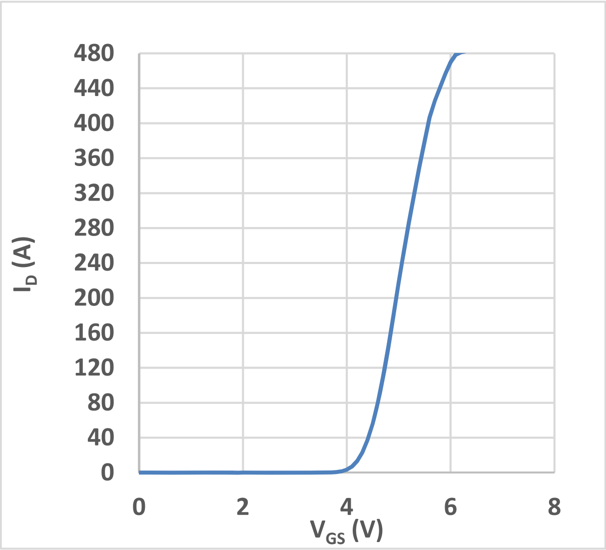


Fig 9: Typ. gate charge

V_{GS} = f(Q_{GATE}); I_D = 100A pulsed

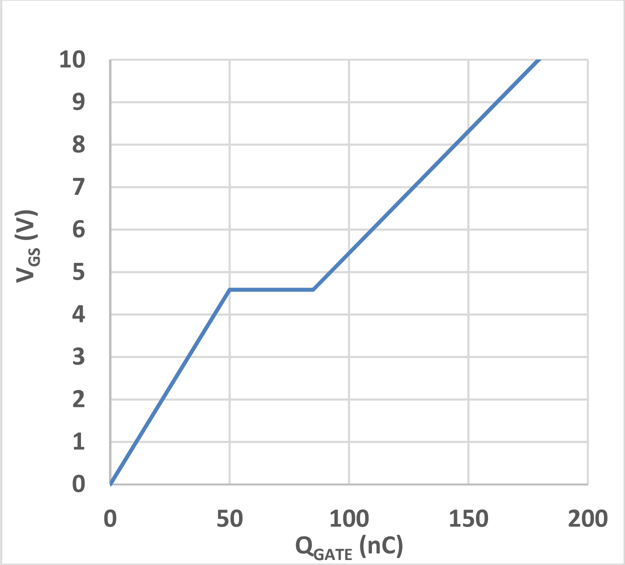


Fig 10: Forward characteristics of body diode

I_F = f(V_{SD}); parameter : Tj, tp = 20uS

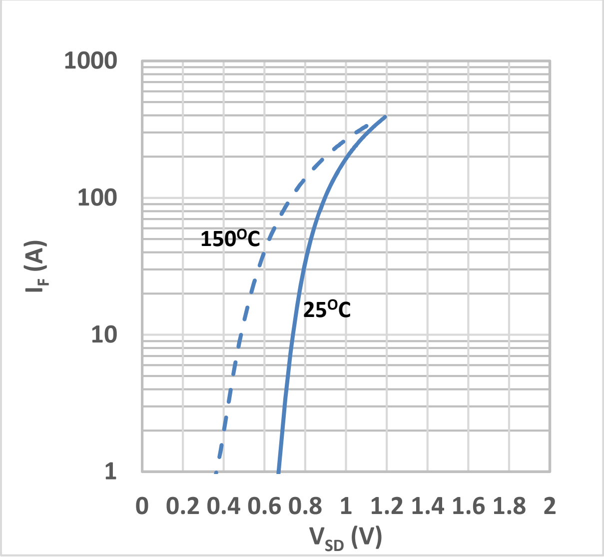


Fig 11: Drain-source breakdown voltage

$V_{(BR)DSS} = f(Tj)$

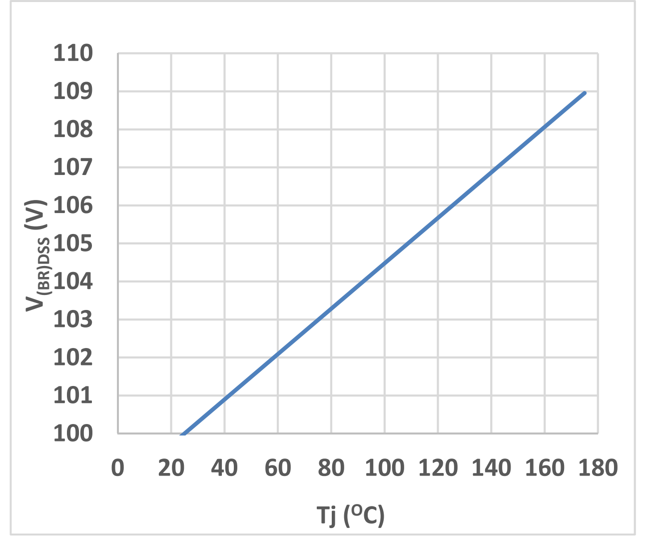


Fig 12: Typ. capacitances

$C = f(V_{DS})$; parameter : $V_{GS} = 0V$, f = 1MHz

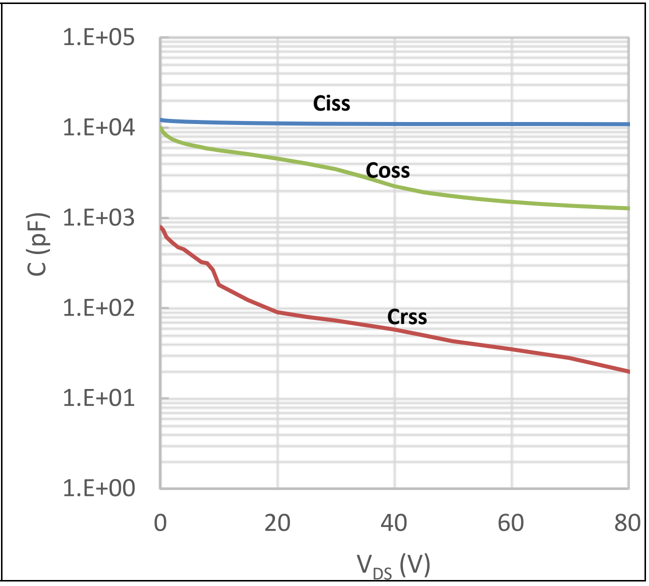
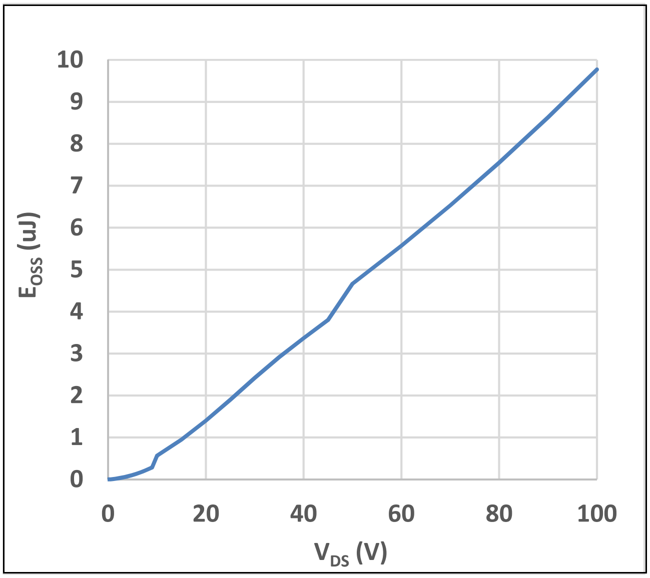
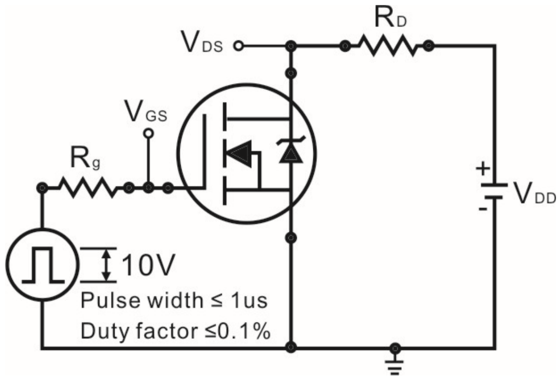
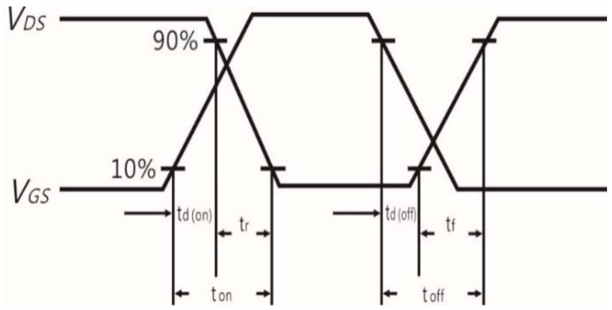


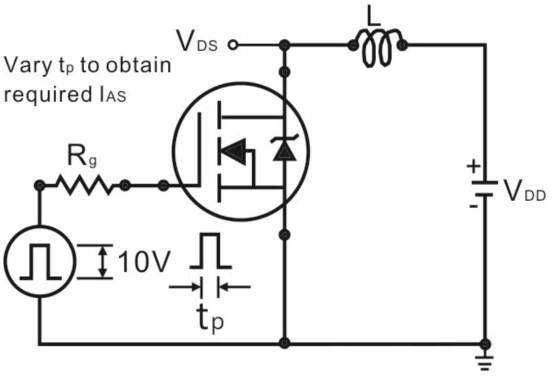
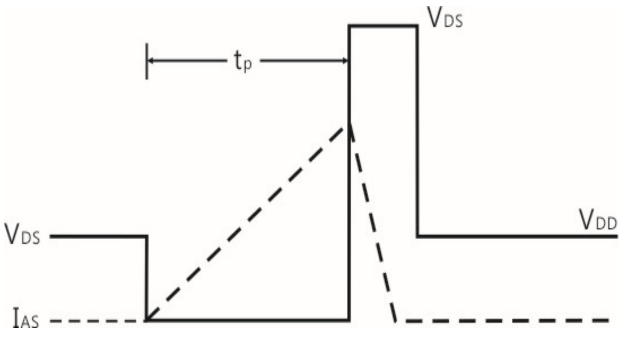
Fig 13: Typ. Coss stored energy

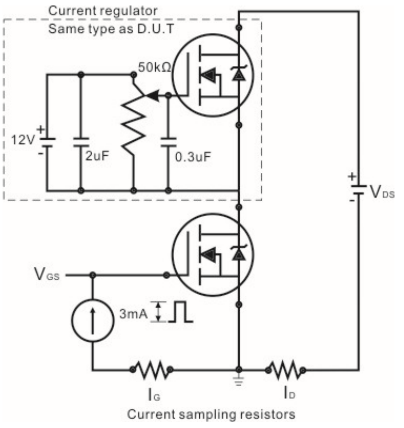
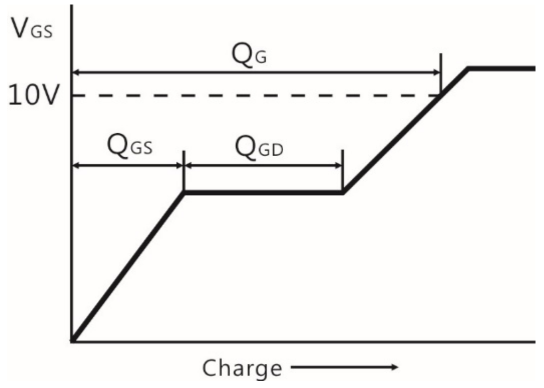
$E_{oss} = f(V_{DS})$



Test Circuit

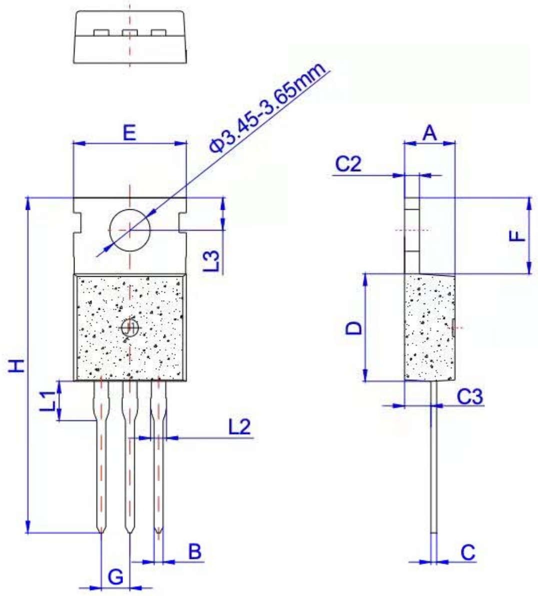
Unclamped test circuit	Unclamped test waveform
	

Gate charge test circuit	Basic gate charge waveform
	

Diode recovery test circuit	Diode recovery test waveform
	

Package outline

PACKAGE MECHANICAL DATA



TO-220C

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.173		0.181
B	0.70		0.90	0.028		0.035
C	0.45		0.60	0.018		0.024
C2	1.23		1.32	0.048		0.052
C3	2.20		2.60	0.087		0.102
D	8.90		9.90	0.350		0.390
E	9.90		10.3	0.390		0.406
F	6.30		6.90	0.248		0.272
G		2.54			0.1	
H	28.0		29.8	1.102		1.173
L1		3.39			0.133	
L2	1.14		1.70	0.045		0.067
L3	2.65		2.95	0.104		0.116
Φ		3.6			0.142	

PACKAGE INFORMATION-TO-220C

OUTLINE	UNIT WEIGHT (g/PCS) typ.	TUBE (PCS)	PER CARTON (PCS)
TUBE	2.08	50	5,000