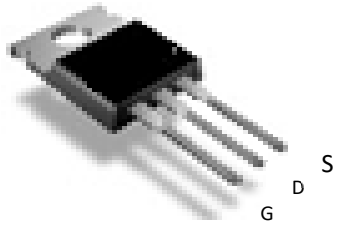
I3GT050N10

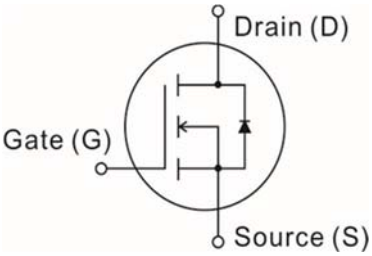
100V N-Channel Power MOSFET

Product Summary

Parameter	Value	Unit
V_{DS} @ Tjmax	100	V
$R_{DS(on),max}$ @ V_{GS} = 10 V	5.0	mΩ
I_D @ V_{GS} = 10 V	130	A
P_{tot}	214	W



TO-220



Features

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

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	130	A
	T_C @ 100℃		110	
Pulsed drain current tp limited by Tj max (Note 1)	T_C @ 25℃	I_D pulsed	420	A
Single pulse avalanche energy (Note 2)		E_{AS}	200	mJ
Gate-source voltage		V_{GS}	± 20	V
Power dissipation	T_C @ 25℃	P_{tot}	214	W
Storage temperature range		T_{STG}	- 55 to +175	℃
Operating junction temperature range	T_C @ 25℃	T_J	- 55 to +175	℃

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100V N-Channel Power MOSFET

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 = 250uA	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℃ Tj=125℃	I_{DSS}	--- ---	0.1 ---	1 100	uA
On characteristics						
Drain-source on-state resistance	V_{GS} = 10V, I_D = 50A, Tj=25℃ V_{GS} = 6V, I_D = 20A, Tj=25℃	$R_{DS(on)}$	--- ---	4.3 4.8	5.0 ---	mΩ
Gate-source threshold voltage	V_{DS} = V_{GS}, I_D = 250uA	$V_{GS(th)}$	1.5	2.0	2.5	V
Transecondtance	V_{DS}≧2*I_D*R_{DS}(on)max, I_D=20A	gfs	---	73	---	S
Gate resistance	F = 1MHz, open drain	R_G	---	0.31	---	Ω
Dynamic and switching characteristics						
Gate-source charge	V_{DD} = 50V, I_D = 50A V_{GS} = 0 to 10V	Q_{gs}	---	12	---	nC
Gate-drain charge		Q_{gd}	---	13	---	
Gate charge total		Q_g	---	50	---	
Turn-on delay time	V_{DD} = 50V, I_D = 30A V_{GS} = 10V, $R_{G,ext}$ = 3Ω	Td(on)	---	14	---	ns
Rise time		Tr	---	45	---	
Turn-off delay time		Td(off)	---	30	---	
Fall time		Tf	---	12	---	
Input capacitance	V_{GS} = 0V, V_{DS} = 50V , F = 1MHz	C_{iss}	---	3300	4290	pF
Output capacitance		C_{oss}	---	540	702	
Reverse transfer capacitance		C_{rss}	---	40	---	
Drain-source diode characteristics and maximum ratings						
Inverse diode forward voltage	I_S = 50A, V_{GS} = 0V	V_{SD}	---	0.9	1.1	V
Reverse recovery time	V_R = 50V, I_F = 40A, di_F / dt = 100A / uS	t_{rr}	---	57	---	ns
Reverse recovery charge		Q_{rr}	---	111	---	nC
Peak reverse recovery current		Irm	---	3.9	---	A

Notes:

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

Thermal characteristics			
Thermal resistance junction-to-ambient	R_{thJA}	62	℃ / W
Thermal resistance junction-to-case	R_{thJC}	0.70	

Package Marking and Ordering Information

Type / Ordering Code	Package	Packaging	Related Links
I3GT050N10	TO-220	Tube	see Package outline

Electrical characteristics diagrams

Fig 1: Power dissipation
$P_{tot} = f(T_C)$

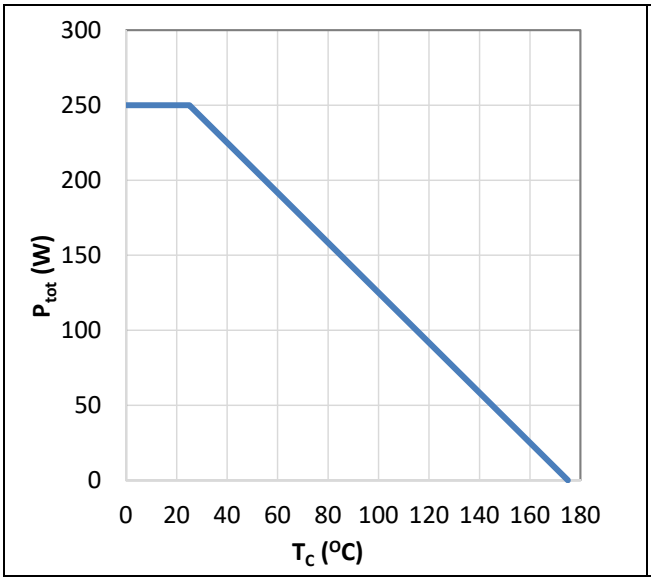
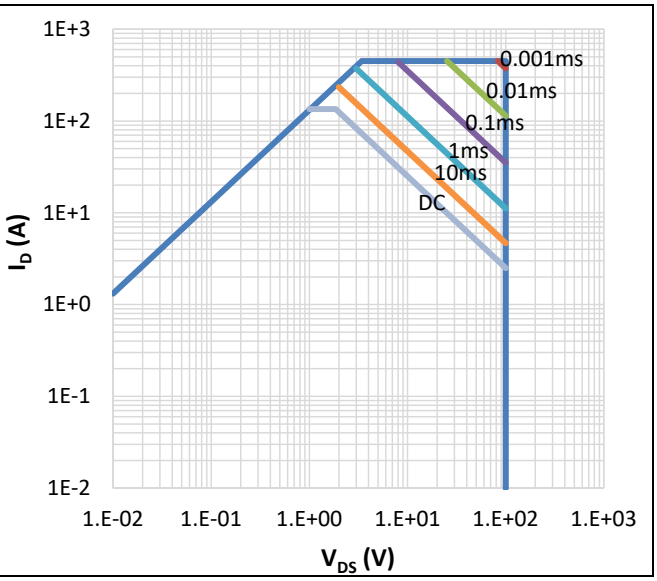


Fig 2: Safe operating area
$I_D = f(V_{DS})$; parameter : D = 0, T_C = 25℃



Electrical characteristics diagrams

Fig 3: Transient thermal impedance
Z_{thJC} = f (tp); parameter : D = tp / T

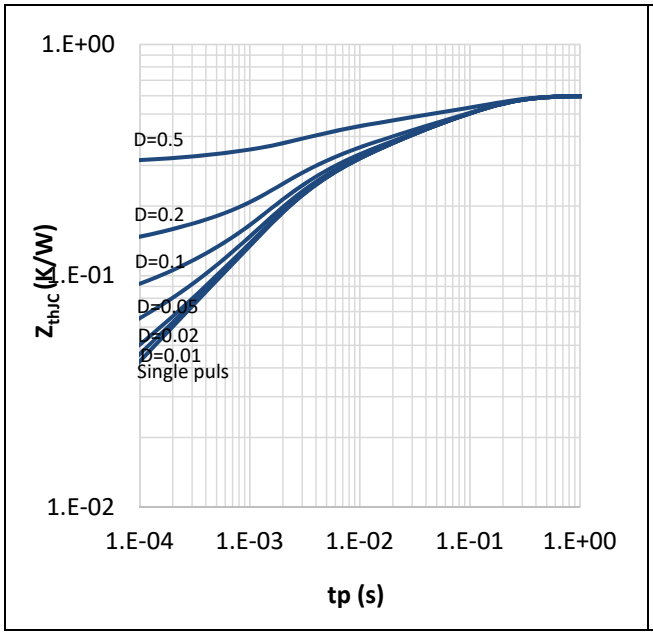


Fig 4: Typ. output characteristics
I_D = f $_{(VDS)}$; Tj = 25℃; parameter: V_{GS}

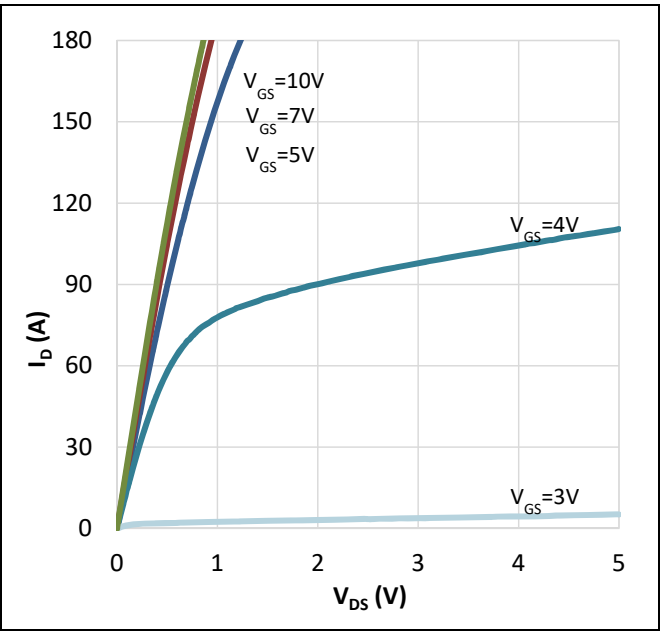


Fig 5: Drain current
I_D = f (T_C) ; V_{GS} >= 10V

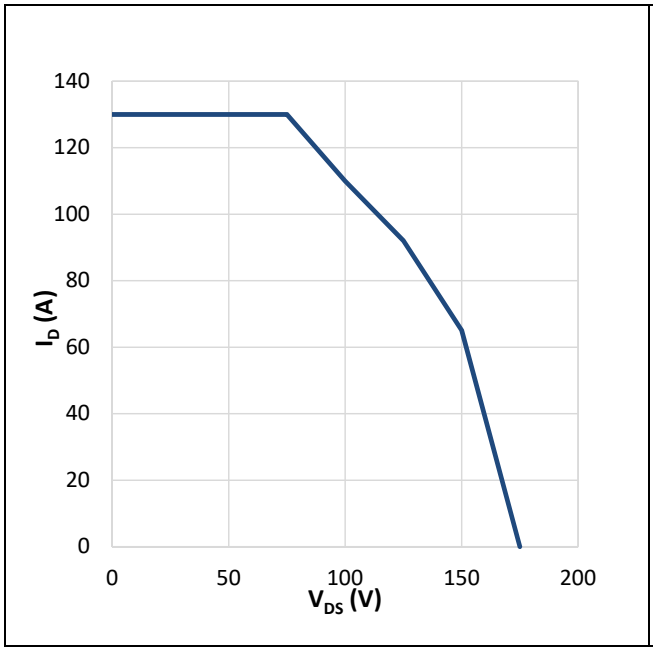


Fig 6: Typ. Drain source on-resistance
$R_{DS(on)}$ = f (I_D); parameter : tp = 50uS, Tj = 25℃, V_{GS}

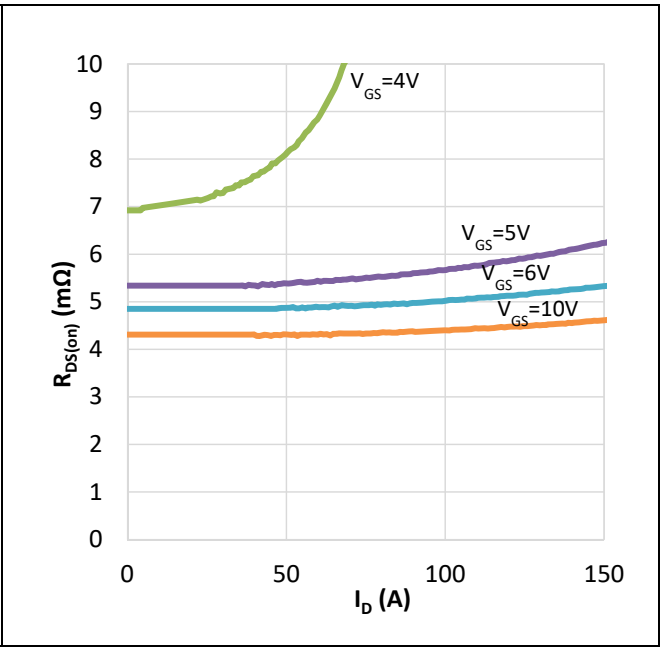


Fig 7: Drain-source on-state resistance
$R_{DS(on)}$= Tj ; parameter : I_D = 10A, V_{GS} = 10V

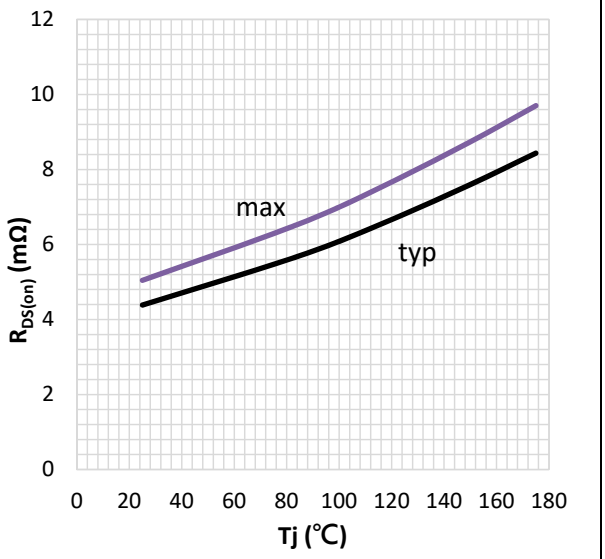


Fig 8: Typ. transfer characteristics
I_D = f (V_{GS}); V_{DS} ≧2 X I_D X $R_{DS(on)\ max}$; Tj = 25℃; parameter : tp = 50 uS

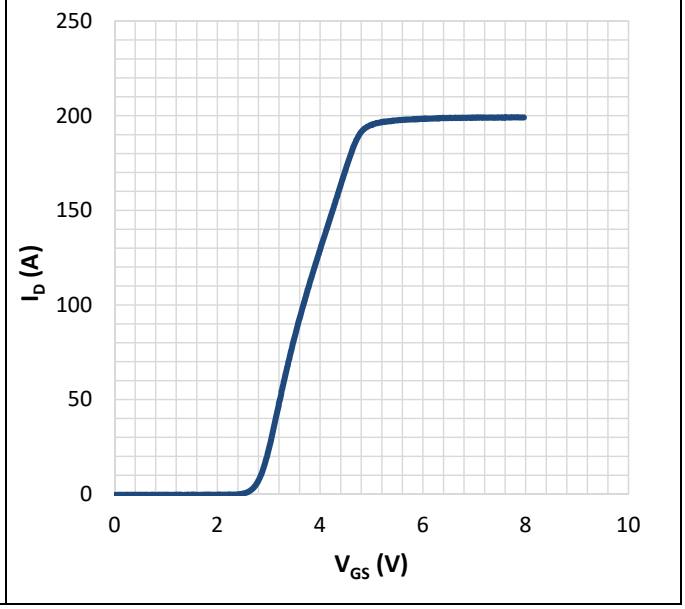


Fig 9: Typ. gate charge
V_{GS} = f(Q_{GATE}); I_D = 50A pulsed

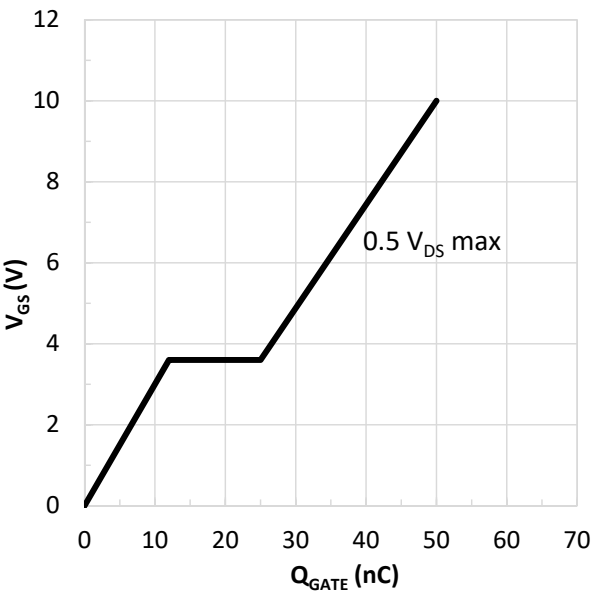


Fig 10: Forward characteristics of body diode
I_F = f(V_{SD}); parameter : Tj, tp = 20uS

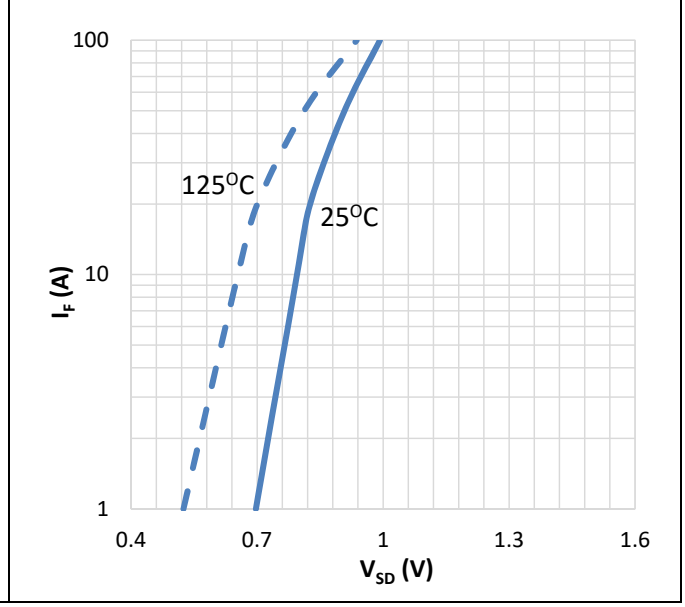


Fig 11: Drain-source breakdown voltage
$V_{(BR)DSS}$ = f(Tj)

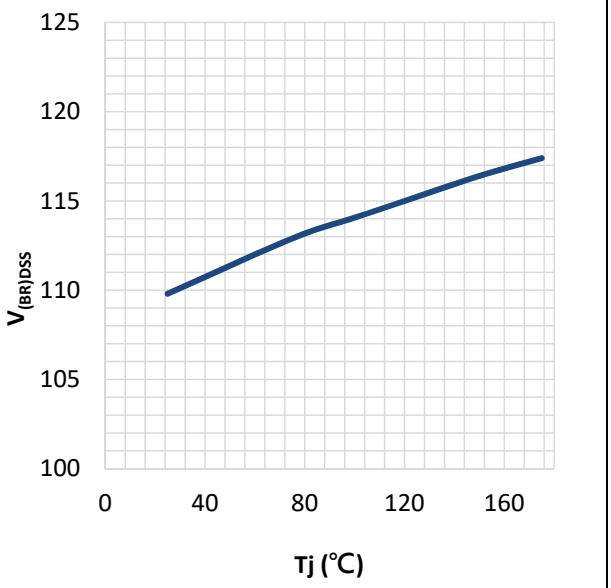


Fig 12: Typ. capacitances
C = f (V_{DS}); parameter : V_{GS} = 0V, f = 1MHz

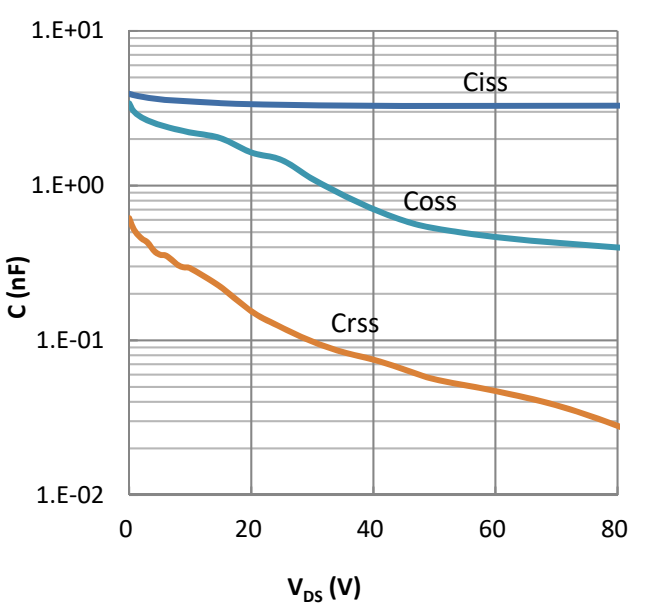
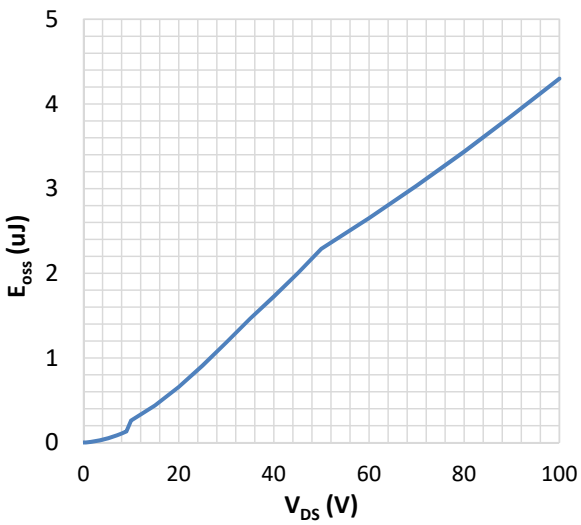
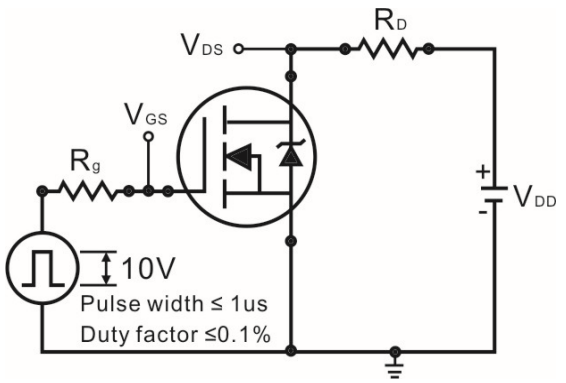
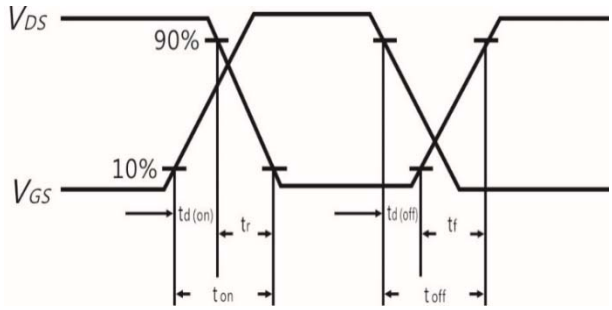
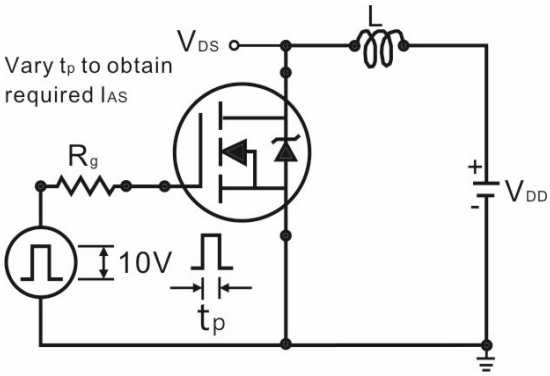
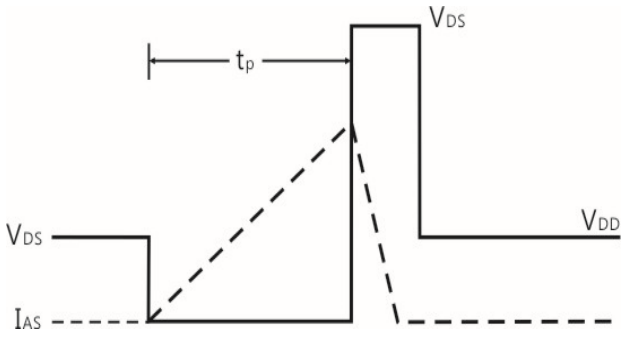


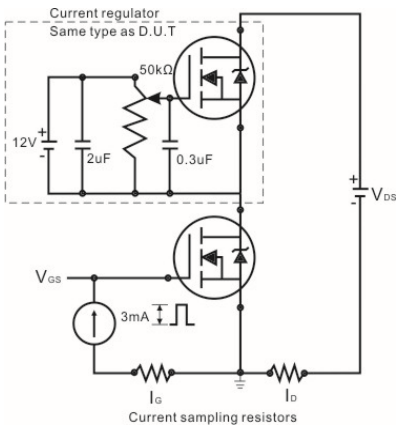
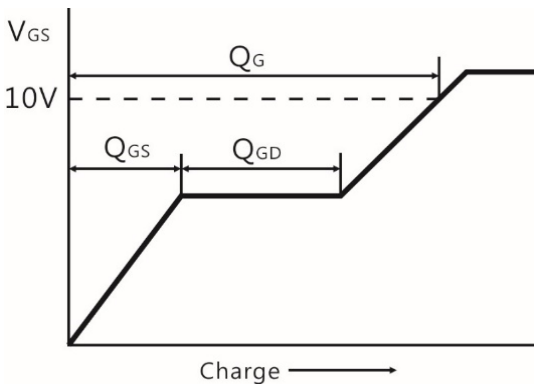
Fig 13: Typ. Coss stored energy
E_{oss} = f (V_{DS})



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