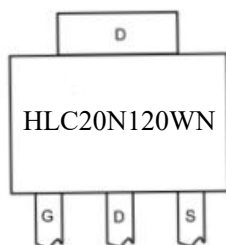


**Features**

- Low on-resistance
- Fast switching speed
- Fast reverse recovery
- Easy to parallel
- Simple to drive
- Pb-free lead plating
- RoHS compliant

Bvdss**1200V****Rdson****12mΩ****ID****85A****Application**

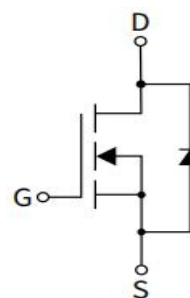
- Solar inverters
- DC/DC converters
- Switch mode power supplies
- Induction heating
- Motor drives

RoHS**Package**

Marking and pin assignment



TO247N top view



Schematic diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Quantity
HLC20N120WN	HLC20N120WN	TO247N	30

Absolute Maximum Ratings ($T_{VJ}=25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	1200	V
Gate-Source Voltage (DC)	V_{GSS}	-4 ~22	V
Gate-Source Surge Voltage ($t_{\text{surge}} < 300\text{nsec}$) ³	V_{GSS_surge}	-4 ~26	V
Continuous Drain Current ¹	I_D	$T_C=25^{\circ}\text{C}$ 85	A
		$T_C=100^{\circ}\text{C}$ 56	A
Pulsed Drain current ($T_C=25^{\circ}\text{C}$) ²	I_{D_pulse}	187	A
Recommended drive voltage ⁴	V_{GS_op}	0/18	V
Power Dissipation	P_D	315	W
Virtual Junction temperature	T_{VJ}	175	$^{\circ}\text{C}$
Range of storage temperature	T_{STG}	-55 ~ 175	$^{\circ}\text{C}$



Thermal Resistance Ratings

Parameter	Symbol	Value	Unit
Thermal Resistance Junction-Case ¹	R_{thJC}	0.44	K/W

Ordering Information

Ordering Number	Package	Pin Assignment			Packing
Halogen Free		G	D	S	
HLC20N120WN	TO247N	1	2	3	Tube

Electrical Characteristics ($T_{VJ}=25^{\circ}\text{C}$ unless otherwise noted)

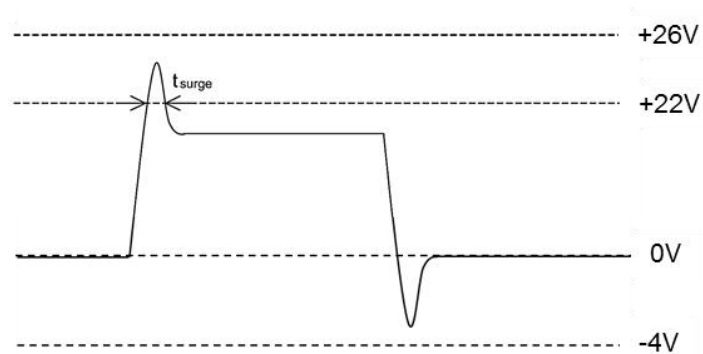
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=1mA, T_{VJ}=25^{\circ}\text{C}$	1200	-	-	V
		$V_{GS}=0V, I_D=1mA, T_{VJ}=-55^{\circ}\text{C}$	1200	-	-	V
Zero Gate voltage Drain current	I_{DSS}	$V_{DS}=1200V, V_{GS}=0V, T_{VJ}=25^{\circ}\text{C}$	-	1	10	μA
		$V_{DS}=1200V, V_{GS}=0V, T_{VJ}=150^{\circ}\text{C}$	-	2	-	
Gate - Source leakage current	I_{GSS+}	$V_{GS}=+22V, V_{DS}=0V$	-	-	100	nA
	I_{GSS-}	$V_{GS}=-4V, V_{DS}=0V$	-	-	-100	
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=10V, I_D=10mA$	2.3	-	3.5	V
Drain-Source On-Resistance ⁵	$R_{DS(on)}$	$V_{GS}=18V, I_D=20A, T_{VJ}=25^{\circ}\text{C}$	-	12	16	m Ω
		$V_{GS}=18V, I_D=20A, T_{VJ}=150^{\circ}\text{C}$	-	25	-	
Gate input resistance	R_G	$f=1\text{MHz}$, Open drain	-	7	-	Ω
Transconductance ⁵	g_{fs}	$V_{DS}=10V, I_D=20A$	-	8.3	-	S
Input Capacitance	C_{iss}	$V_{DS}=800V, V_{GS}=0V,$ $f=1\text{MHz}$	-	1337	-	pF
Output Capacitance	C_{oss}		-	76	-	
Reverse Transfer Capacitance	C_{rss}		-	27	-	
Total Gate Charge	Q_g	$V_{GS}=18V, V_{DS}=600V, I_D=20A$	-	107	-	nC
Gate-Source Charge	Q_{gs}		-	17	-	
Gate-Drain Charge	Q_{gd}		-	56	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS}=0V/+18V, V_{DS}=400V,$ $R_G=0\Omega, I_D=18A,$ $R_L=22\Omega$	-	21	-	ns
Rise Time	t_r		-	39	-	
Turn-Off Delay Time	$t_{d(off)}$		-	49	-	
Fall Time	t_f		-	24	-	



Turn-on switching loss ⁵	E_{on}	VDS=600V, VGS=0V/18V, ID=20A, RG=0Ω, L=250uH		283		μJ
Turn-off switching loss ⁵	E_{off}	Eon includes diode reverse recovery Lσ=50nH, Cσ=200pF		118		
Diode Forward Current ¹	I_S	Tc=25°C	-	-	85	A
Pulsed Source Current ²	I_{SM}		-	-	187	
Diode Forward Voltage ⁵	V_{SD}	$I_S=20A, V_{GS}=0V$	-	3.2	-	V
Reverse Recovery time ⁵	T_{rr}	$I_F=20A, V_R=600V, dI/dt=100A/μs,$ $L_o=50nH, C_o=200pF$	-	25	-	ns
Reverse Recovery Charge ⁵	Q_{rr}		-	115	-	nC
Peak reverse recovery current ⁵	I_{rrm}		-	9	-	A

Note :

1. Limited by maximum T_{vj} and for Max. R_{thJC} .
2. $PW \leq 10\mu s$, Duty cycle $\leq 1\%$.
3. Example of acceptable V_{GS} waveform.



4. Please be advised not to use SiC-MOSFETs with V_{es} below 13V as doing so may cause thermal runaway.
5. Pulsed.



Typical Performance Characteristics

Fig.1 Power Dissipation Derating Curve

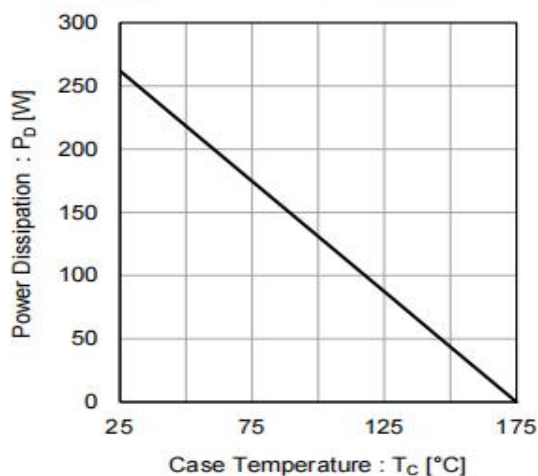


Fig.2 Maximum Safe Operating Area

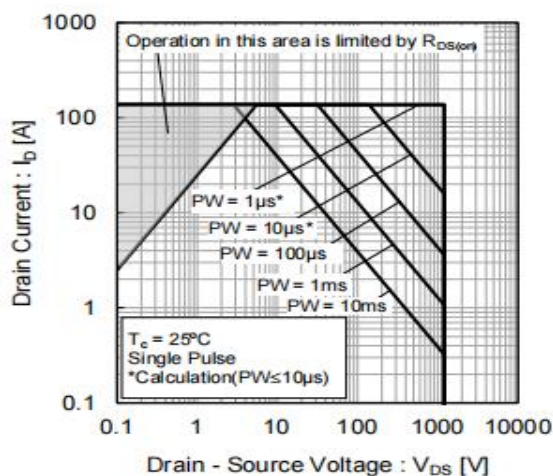


Fig.3 Typical Transient Thermal Resistance vs. Pulse Width

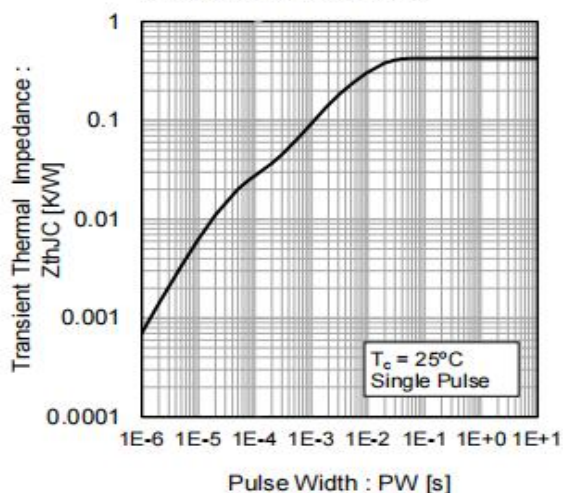


Fig.4 Typical Output Characteristics(I)

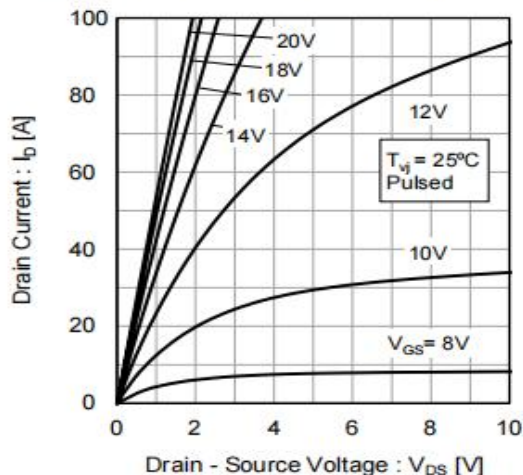


Fig.5 Typical Output Characteristics(II)

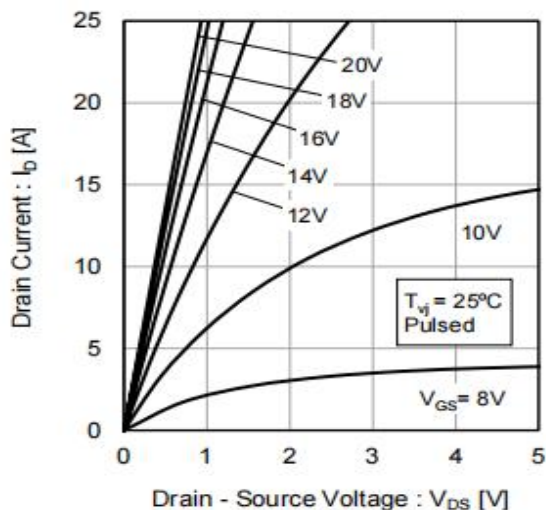
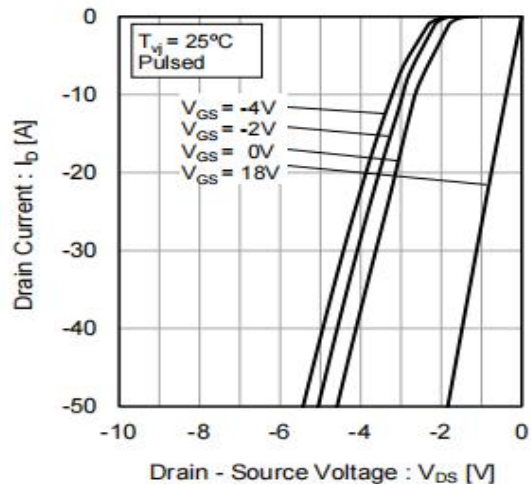
Fig.6 $T_{vj} = 25^\circ\text{C}$ 3rd Quadrant Characteristics

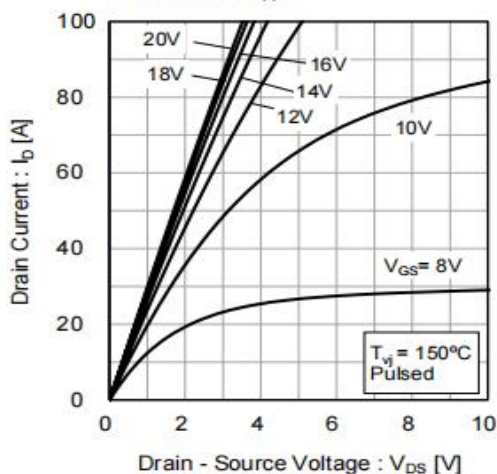
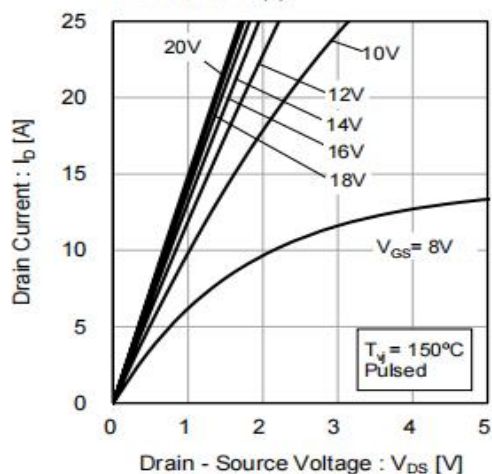
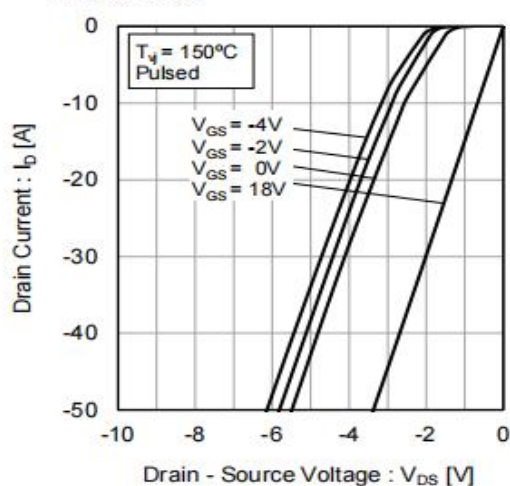
Fig.7 $T_{vj} = 150^{\circ}\text{C}$ Typical Output Characteristics(I)Fig.8 $T_{vj} = 150^{\circ}\text{C}$ Typical Output Characteristics(II)Fig.9 $T_{vj} = 150^{\circ}\text{C}$ 3rd Quadrant Characteristics

Fig.10 Body Diode Forward Voltage vs. Gate-Source Voltage

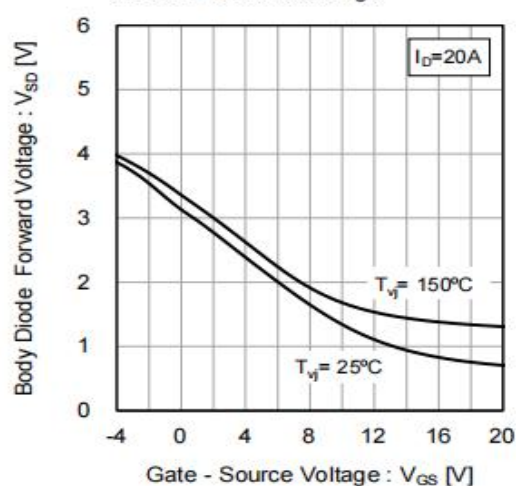


Fig.11 Typical Transfer Characteristics (I)

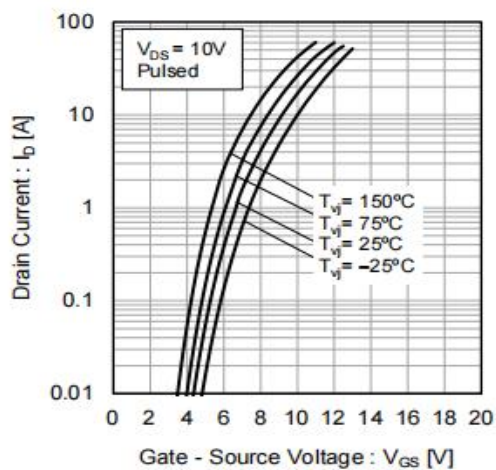


Fig.12 Typical Transfer Characteristics (II)

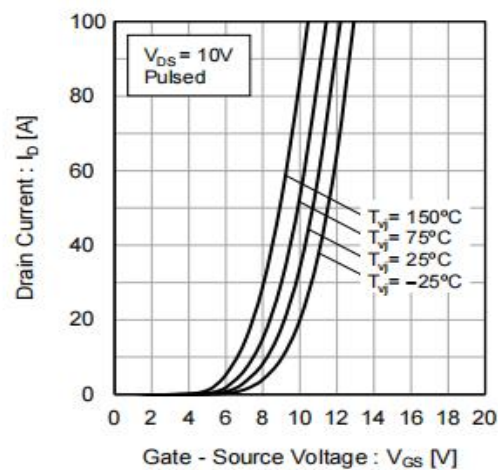




Fig.13 Gate Threshold Voltage vs. Junction Temperature

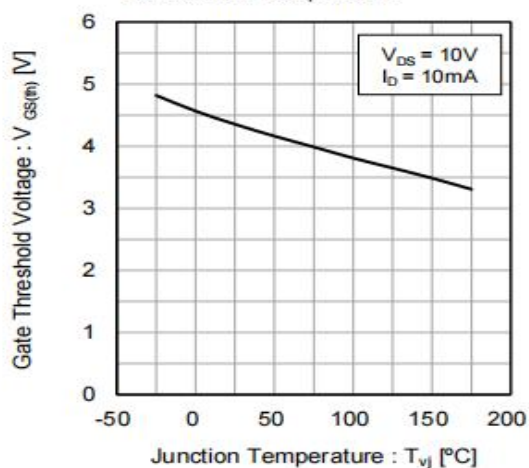


Fig.14 Transconductance vs. Drain Current

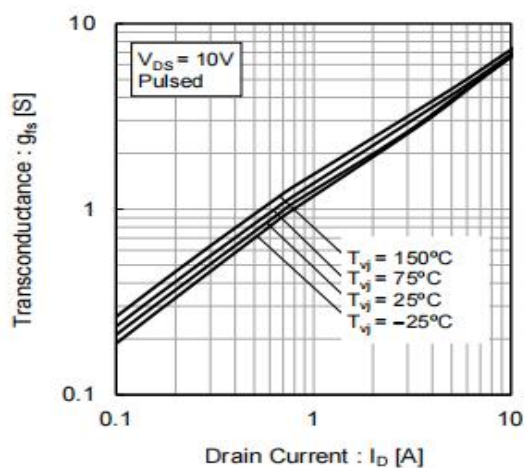


Fig.15 Static Drain - Source On - State Resistance vs. Gate - Source Voltage

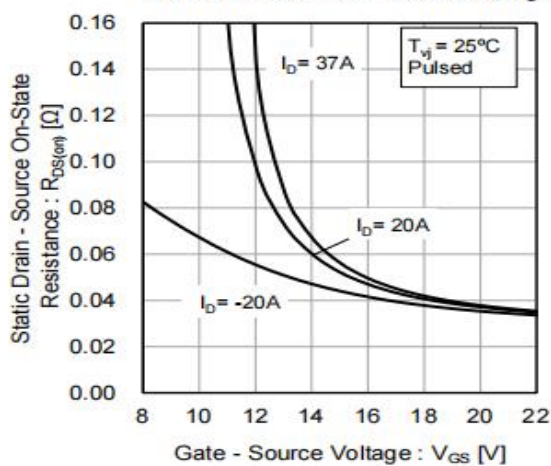


Fig.16 Static Drain - Source On - State Resistance vs. Junction Temperature

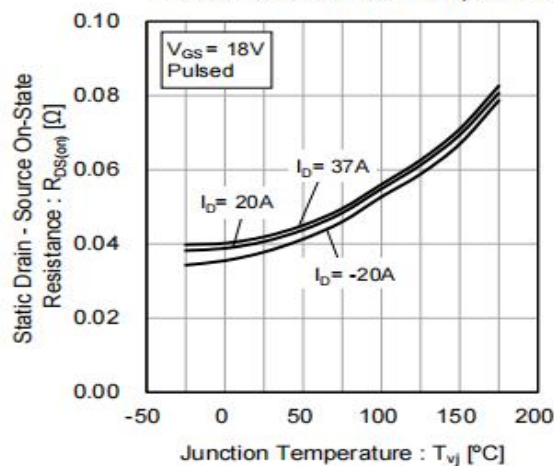


Fig.17 Static Drain - Source On - State Resistance vs. Drain Current

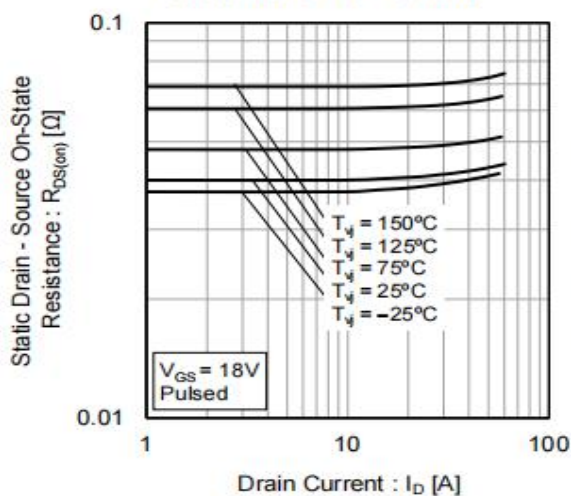


Fig.18 Normalized Drain - Source Breakdown Voltage vs. Junction Temperature

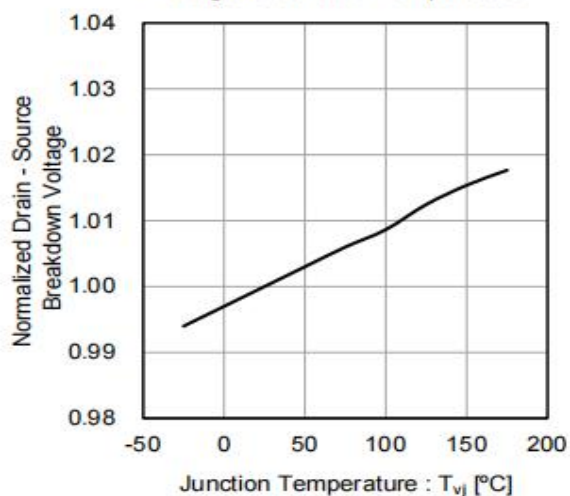


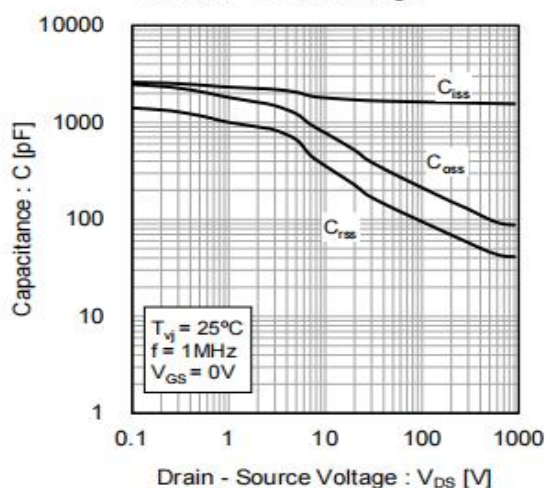
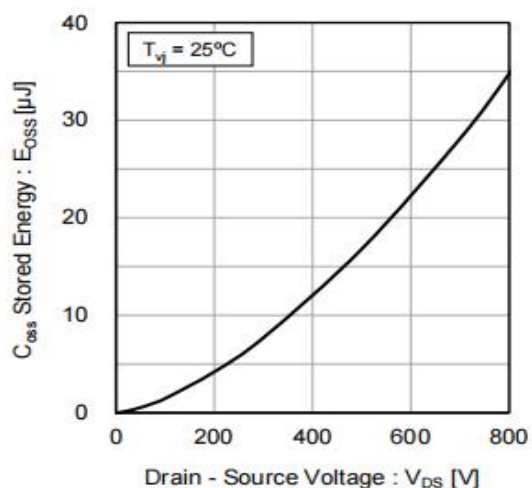
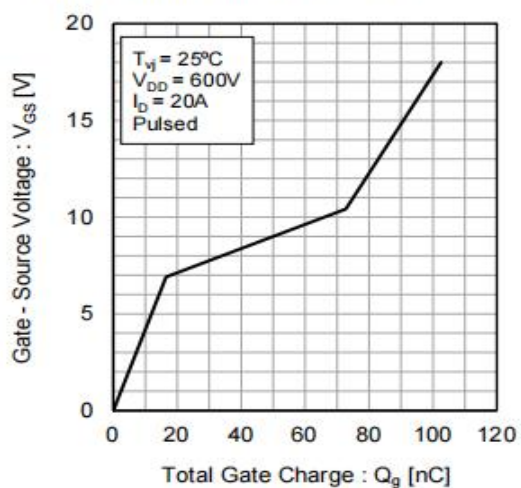
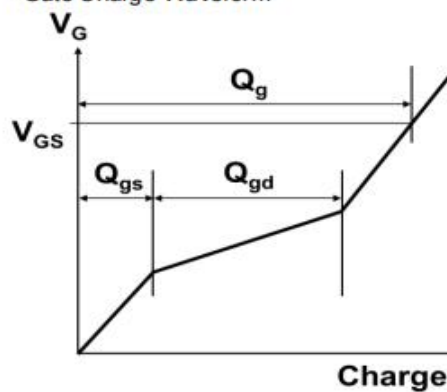
Fig.19 Typical Capacitance
vs. Drain - Source VoltageFig.20 C_{oss} Stored Energy

Fig.21 Dynamic Input Characteristics



*Gate Charge Waveform





Test Circuit and Waveform

Fig.1-1 Gate Charge and Switching Time Measurement Circuit

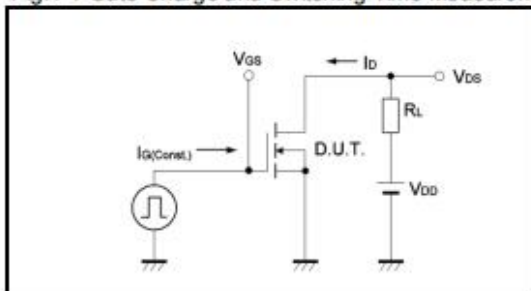


Fig. 1-2 Waveforms for Switching Time

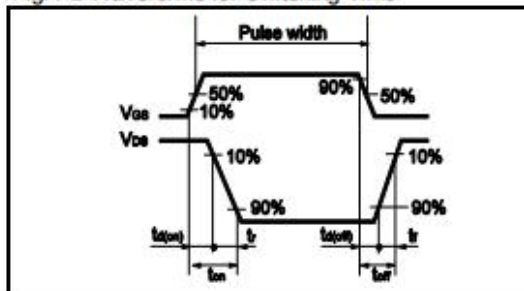


Fig.2-1 Switching Energy Measurement Circuit

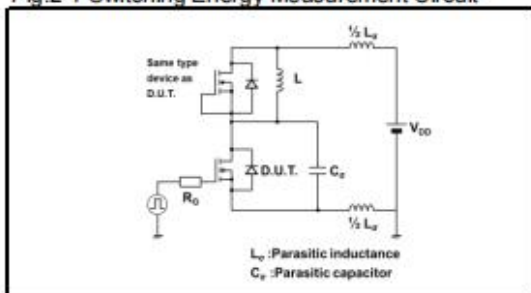


Fig.2-2 Waveforms for Switching Energy Loss

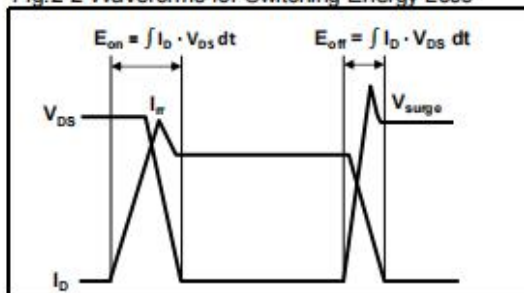


Fig.3-1 Reverse Recovery Time Measurement Circuit

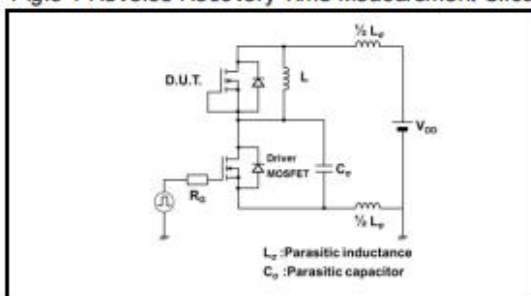
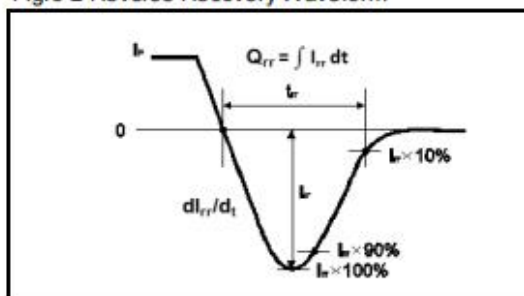
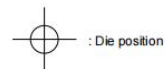
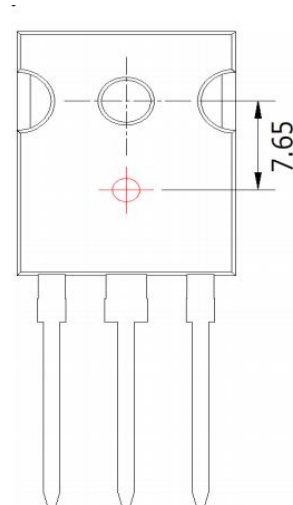
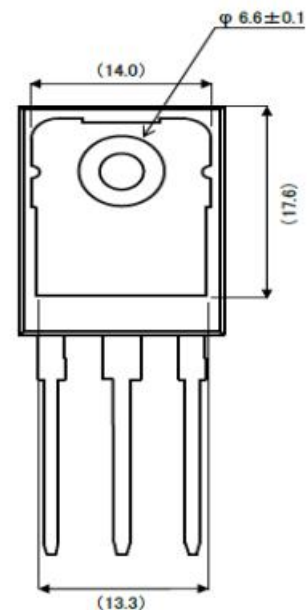
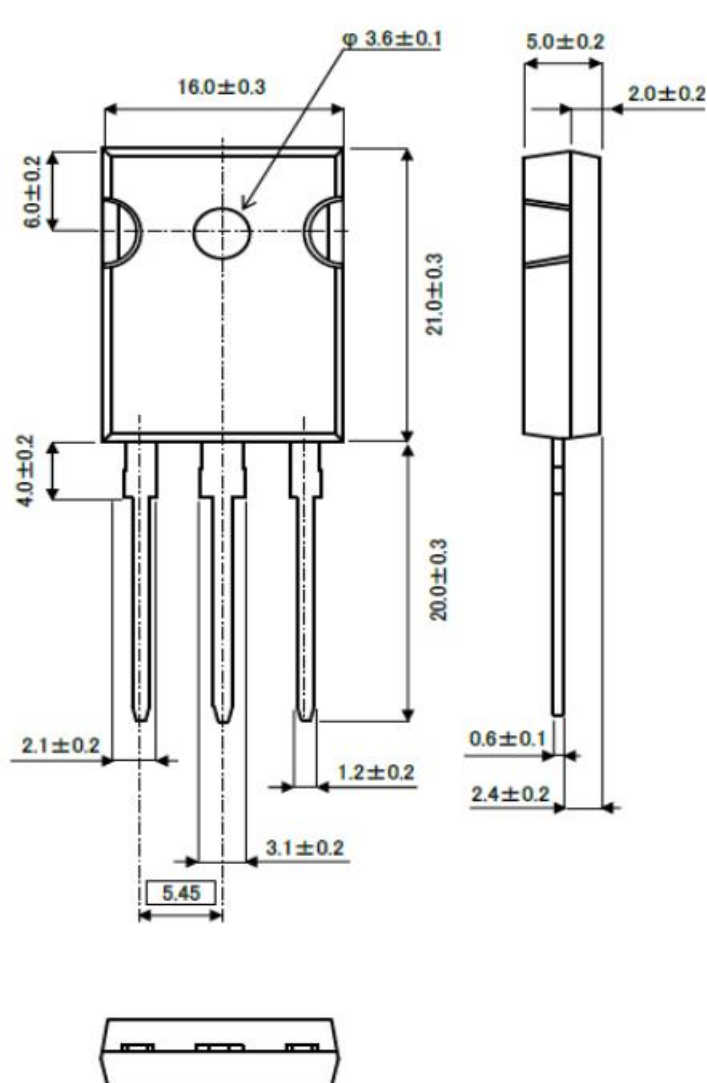


Fig.3-2 Reverse Recovery Waveform





Package Dimensions TO247N



- Front view of the packaging.
- Dimensions are design values.
- If the heat sink is to be installed, it should be in contact with the die bonding point.

Unit: mm



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Chip revision change

Date	Revision	Remarks
2026-09-02	V2.2	Modify Marking and pin assignment information