Product Specification

QNM20N15AYG

150V N-Channel SGT MOSFET

FEATURES

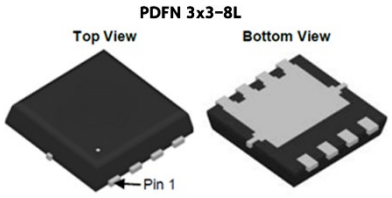
- 150V, 15A

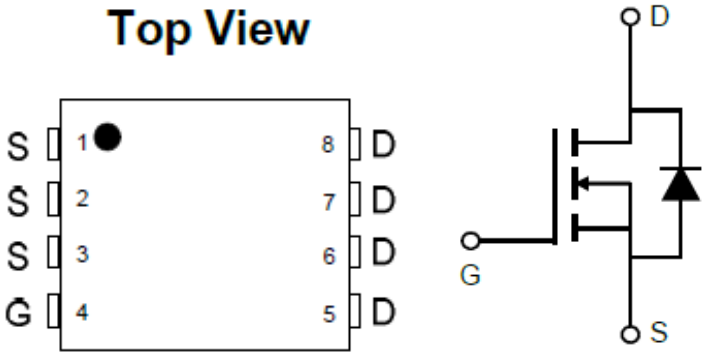
  $R_{DS(ON)}$ Typ = 59 mΩ @ V_{GS} = 10V
- Advanced Split Gate Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead Free

Applications

- Power Managerment in Telecom., Industrial Automation, CE
- Current Switching in DC/DC & AC/DC Sub-systems
- Motor Driving in Power Tool, E-vehicle, Robotics

Pin Description



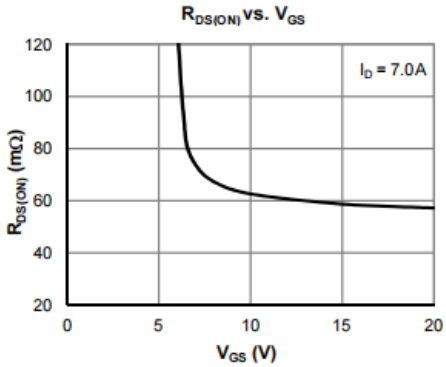


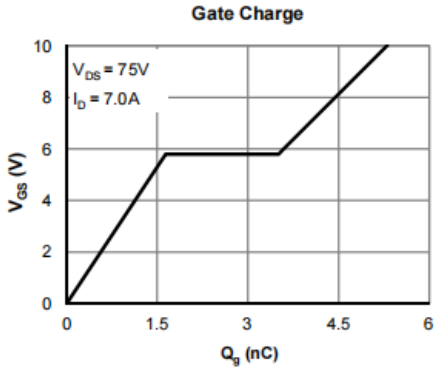
NO.	Symbol	Description
1	S	SOURCE
2	S	SOURCE
3	S	SOURCE
4	G	GATE
5	D	DRAIN
6	D	DRAIN
7	D	DRAIN
8	D	DRAIN

Absolute Maximum Ratings

(@ T_C = 25℃ unless otherwise specified)

Symbol	Parameter		Value	Unit
V_{DS}	Drain-to-SourceVoltage		150	V
V_{GS}	Gate-to-Source Voltage		±20	V
I_D	ContinuousDrain Current (1)	T_C = 25℃	15	A
		T_C=100℃	8.6	
I_{DM}	Pulsed Drain Current (2)		37	A
I_{AS}	Avalanche Current (3)		20	A
E_{AS}	Avalanche Energy (3)		20	mJ
P_D	Power Dissipation (4)	T_C=25℃	28	W
		T_C=100℃	11	
T_J,T_{STG}	Junction & Storage Temperature Range		-55 to 150	℃





Electrical Characteristics

(T_J = 25℃ unless otherwise specified)

Symbol	Parameter	TestCondition	Min	Typ	Max	Unit
Static Characteristics						
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS}=0V,I_D=250uA	150	-	-	V
I_{DSS}	Zero gate voltage drain current	V_{DS}=120V,V_{GS}=0V	-	-	1.0	uA
		T_J = 55℃			5.0	
I_{GSS}	Gate-body leakage current	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS}=V_{GS},I_D=250uA	2.5	3.0	4.5	V
$R_{DS(on)}$	Static Drain-Source ON-Resistance	V_{GS}=10V,I_D=15A	-	59	75	Ω
g_{FS}	Forward tranconductance	V_{DS}=5V,I_D=7A		10-	-	S
V_{SD}	Diode Forward Voltage	I_S = 1A, V_{GS} = 0V		0.73	1.0	V
I_S	Diode Continuous Current	T_C = 25°C			28	A
Dynamic characteristics						
C_{iss}	InputCapacitance	V_{DS}=75V, V_{GS}=0V, f=1MHz	-	373	-	pF
C_{oss}	Output Capacitance		-	94	-	
C_{rss}	Reverse Transfer Capacitance		-	6.6	-	
R_g	Gate Resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		1.5		Ω
Switching characteristics						
Q_g	Total Gate Charge(@V_{GS}=10V)	V_{GS}= 0 to 10V V_{DS}=75V, I_D=7A	-	5.3	-	nC
Q_g	Total Gate Charge (@V_{GS}=6.0V)			3.6		
Q_{gs}	Gate-Source Charge		-	1.6	-	
Q_{gd}	Gate-Drain Charge		-	1.9	-	
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_D=75V R_L=10Ω, R_{GEN}=6Ω	-	4.3		ns
t_r	Turn-On Rise Time			3.5		ns
$t_{D(off)}$	Turn-Off DelayTime		-	7.6	3	ns
t_f	Turn-Off Fall Time			3.5		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=7A, dIF/dt=100A/us	-	75	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=7A, dIF/dt=100A/us	-	99	-	nc

Thermal Performance

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	55	65	℃ /W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	3.5	4.5	℃ /W

Notes:

1.Computed continuous current assumes the condition of T_{J_Max} while the actual continuous current depends on the thermal & electro-mechanicalapplication board design.

2. This single-pulse measurement was taken under T_{J_Max} = 150℃.

3. This single-pulse measurement was taken under the following condition [L = 100uH, V_{GS} = 10V, V_{DS} = 75V] while its value is limited byT_{J_Max} = 150℃.

4.The power dissipation P_D is based on T_{J_Max} = 150℃.

5. This value is guaranteed by design hence it is not included in the production test.

Typical Electrical & Thermal Characteristics

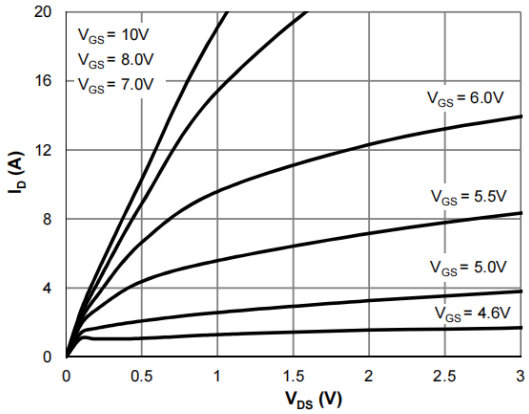


Figure 1: Saturation Characteristics

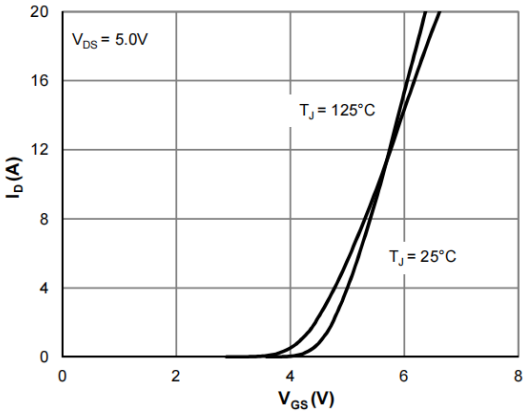


Figure 2: Transfer Characteristics

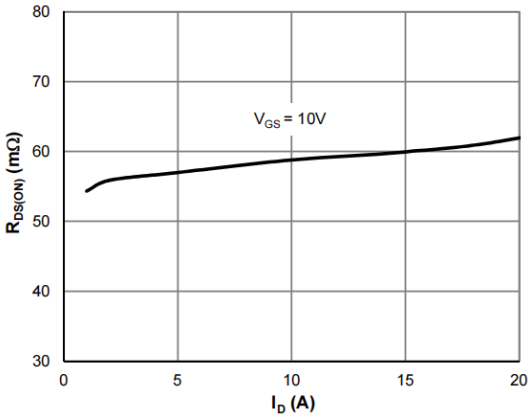


Figure 3: $R_{DS(ON)}$ vs. Drain Current

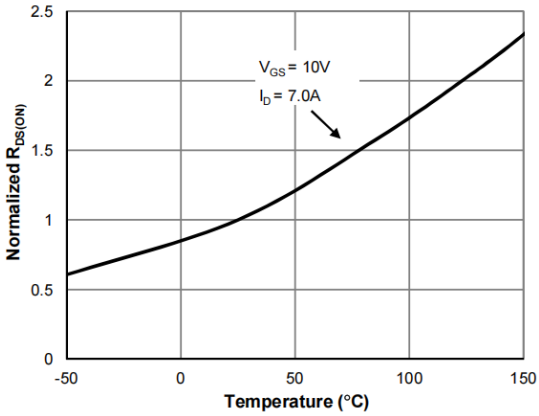


Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

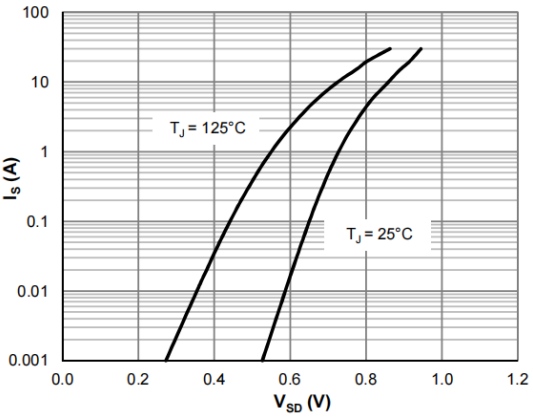


Figure 5: Body-Diode Characteristics

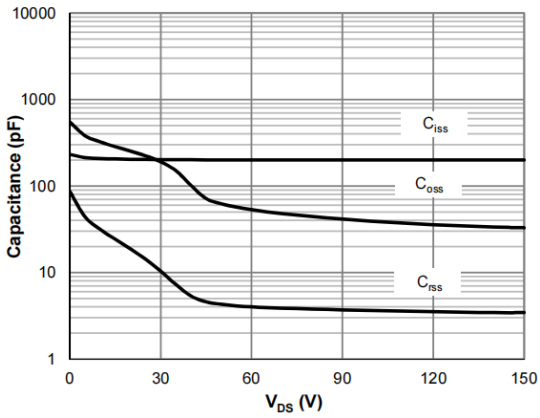


Figure 6: Capacitance Characteristics

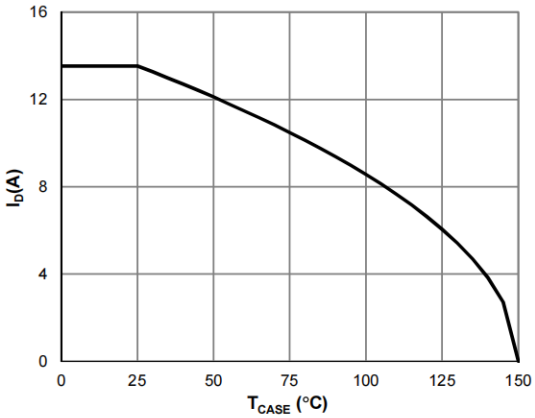


Figure 7: Current De-rating

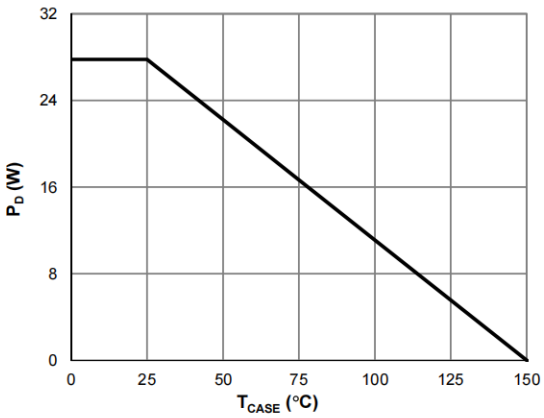


Figure 8: Power De-rating

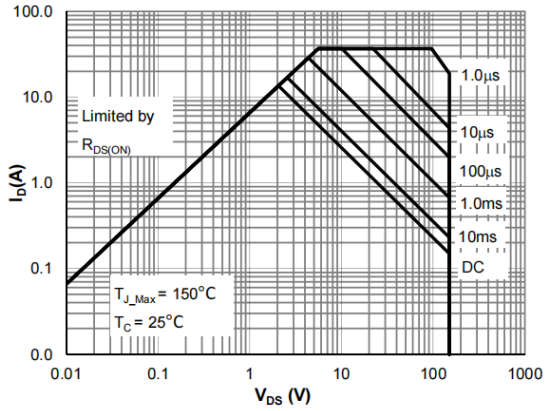


Figure 9: Maximum Safe Operating Area

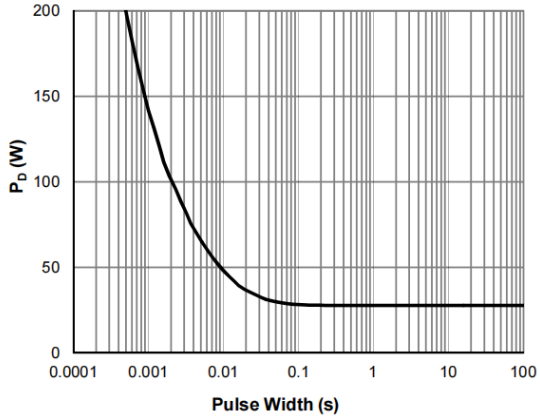


Figure 10: Single Pulse Power Rating, Junction-to-Case

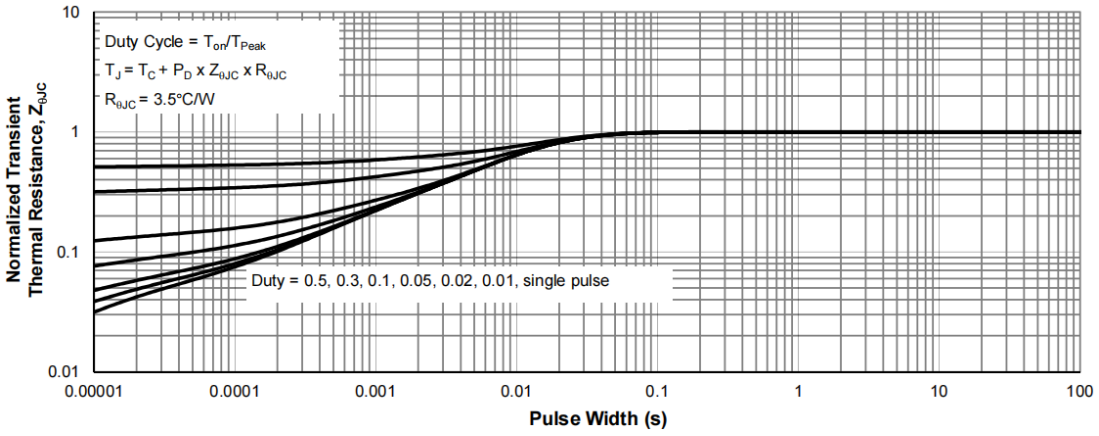


Figure 11: Normalized Maximum Transient Thermal Impedance

Test Circuit

Figure 1: Gate Charge Test Circuit & Waveform

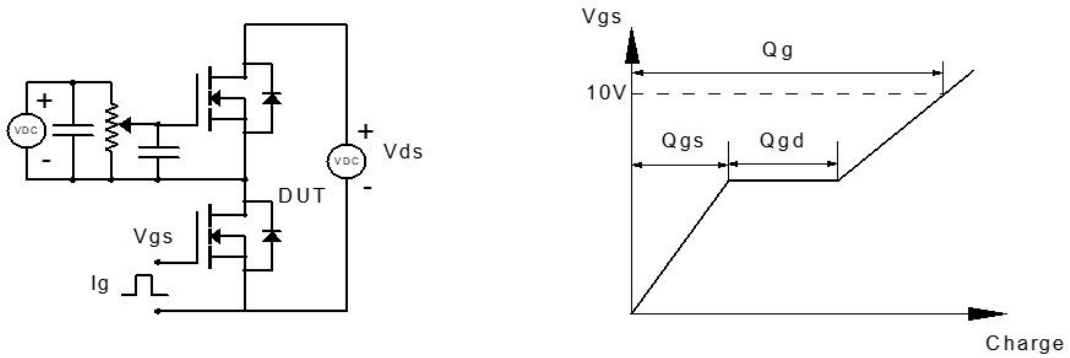


Figure 2: Resistive Switching Test Circuit & Waveform

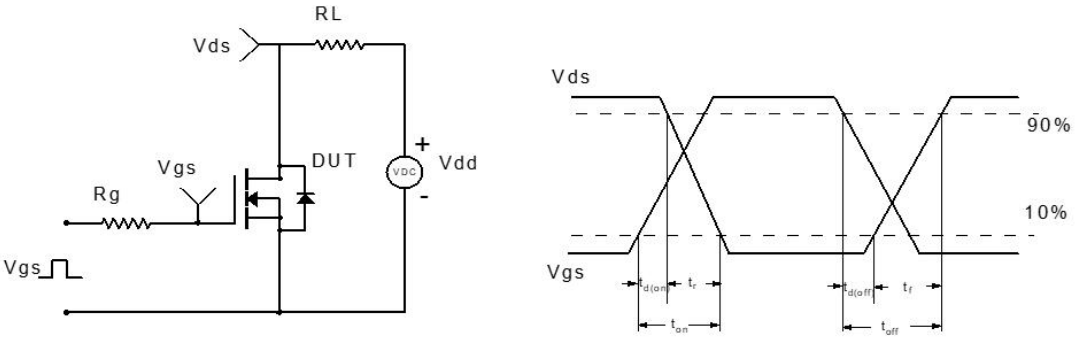


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

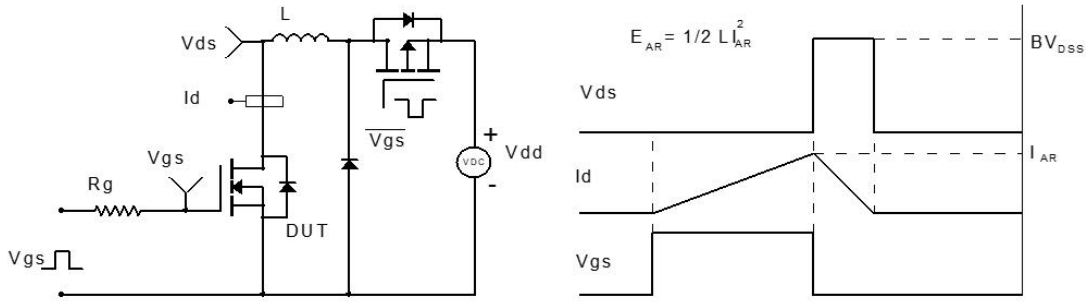
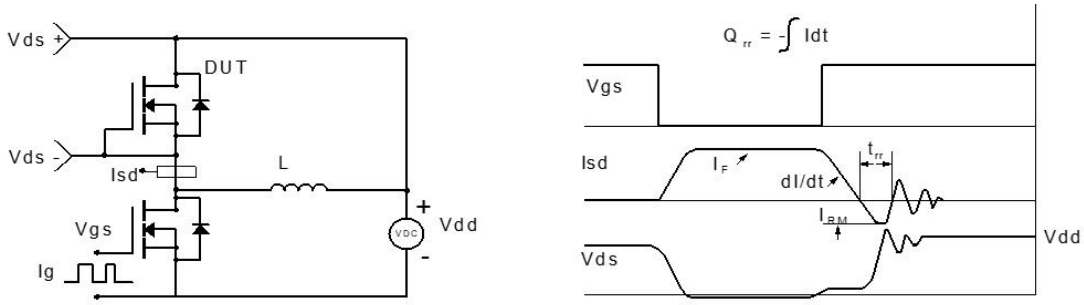
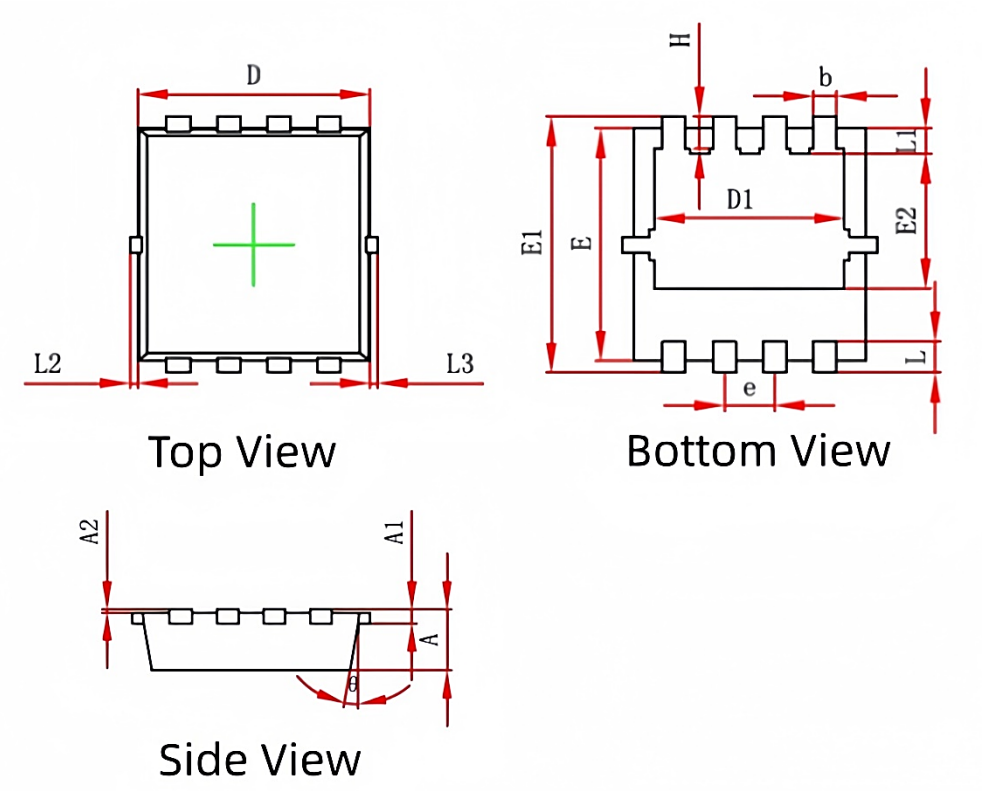


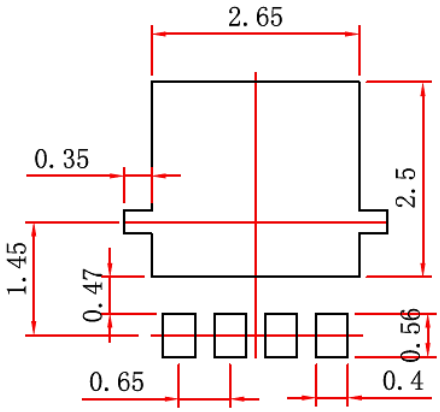
Figure 4: Diode Recovery Test Circuit & Waveform



Package Mechanical Data(PDFN 3x3-8)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.650	0.850	0.026	0.033
A1	0.152 REF.		0.006 REF.	
A2	0~0.05		0~0.002	
D	2.900	3.100	0.114	0.122
D1	2.300	2.600	0.091	0.102
E	2.900	3.100	0.114	0.122
E1	3.150	3.450	0.124	0.136
E2	1.535	1.935	0.060	0.076
b	0.200	0.400	0.008	0.016
e	0.550	0.750	0.022	0.030
L	0.300	0.500	0.012	0.020
L1	0.180	0.480	0.007	0.019
L2	0~0.100		0~0.004	
L3	0~0.100		0~0.004	
H	0.315	0.515	0.012	0.020
θ	9°	13°	9°	13°



Note:

1.Controlling dimension: in millimeters.

2.General tolerance: ±0.05mm.

3.The pad layout is for reference purposes only.

Ordering information

Order Code	Package	V_{DS}(V)	I_D(A)	$R_{DS(ON)}$(mΩ)	
QNM20N15AYG	PDFN 3x3-8	150	15	V_{GS}=10V	59