

FEATURES

Super Low Gate Charge
Green Device Available
Excellent Cdv/dt effect decline
Advanced high cell density Trench
technology

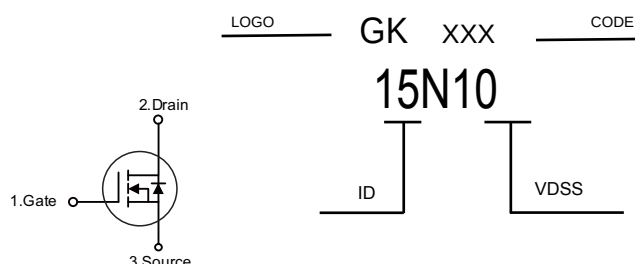
DESCRIPTION

The 15N10 is the highest performance trench N-ch MOSFETs with extreme high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The 15N10 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

V_{DS} 100 V
 I_D 15 A
 $R_{DS(ON)}$ 85 mΩ

GK XXX
15N10



MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_{D@T_C=25^\circ\text{C}}$	Continuous Drain Current, $V_{GS} @ 10V^1$	15	A
$I_{D@T_C=100^\circ\text{C}}$	Continuous Drain Current, $V_{GS} @ 10V^1$	8	A
$I_{D@T_A=25^\circ\text{C}}$	Continuous Drain Current, $V_{GS} @ 10V^1$	3	A
$I_{D@T_A=70^\circ\text{C}}$	Continuous Drain Current, $V_{GS} @ 10V^1$	2.4	A
I_{DM}	Pulsed Drain Current ²	20	A
EAS	Single Pulse Avalanche Energy ³	6.1	mJ
I_{AS}	Avalanche Current	10	A
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation ³	30	W
$P_D@T_A=25^\circ\text{C}$	Total Power Dissipation ³	2	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient ¹	---	70	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	6.6	$^\circ\text{C/W}$

Electrical characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	100	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =100V, V _{GS} =0V,	-	-	1.0	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} =±20V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1.0	1.5	2.5	V
R _{DS(on)}	Static Drain-Source on-Resistance note3	V _{GS} =10V, I _D =5A	-	85	110	mΩ
		V _{GS} =4.5V, I _D =3A	-	96	140	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =25V, V _{GS} =0V, f=1.0MHz	-	765	-	pF
C _{oss}	Output Capacitance		-	38	-	pF
C _{rss}	Reverse Transfer Capacitance		-	33	-	pF
Q _g	Total Gate Charge	V _{DS} =50V, I _D =2A, V _{GS} =10V	-	18	-	nC
Q _{gs}	Gate-Source Charge		-	2.5	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	4	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DS} =50V, I _D =3A, R _G =1.8Ω, V _{GS} =10V	-	7.5	-	ns
t _r	Turn-on Rise Time		-	6	-	ns
t _{d(off)}	Turn-off Delay Time		-	21	-	ns
t _f	Turn-off Fall Time		-	9	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	10	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	40	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S =10A	-	-	1.2	V
t _{rr}	Body Diode Reverse Recovery Time	I _F =3A, dI/dt=100A/μs	-	21	-	ns
Q _{rr}	Body Diode Reverse Recovery Charge		-	22	-	nC

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition : $T_J=25^{\circ}\text{C}, V_{DD}=30V, V_G=10V, L=0.5mH, R_g=25\Omega, I_{AS}=4A$

3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

RATING AND CHARACTERISTIC CURVES

Figure1: Output Characteristics

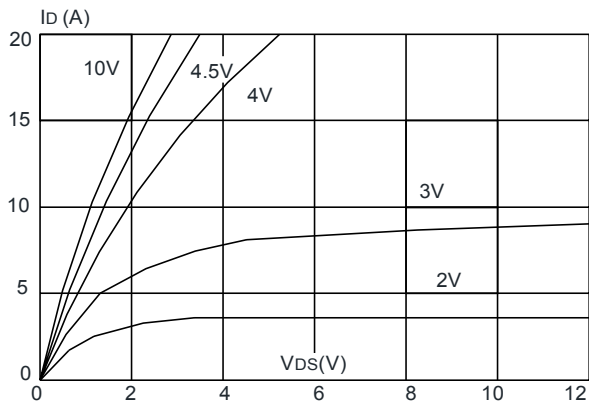


Figure 2: Typical Transfer Characteristics

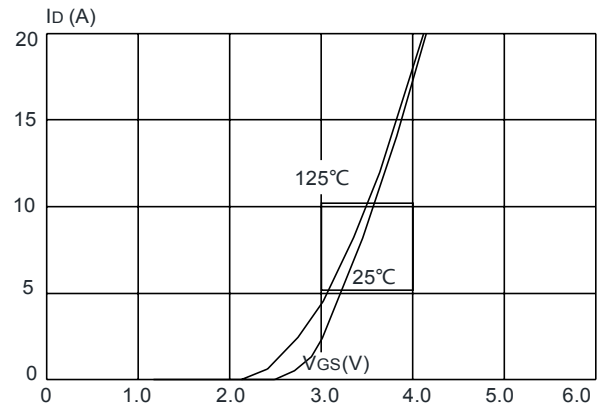


Figure 3: On-resistance vs. Drain Current

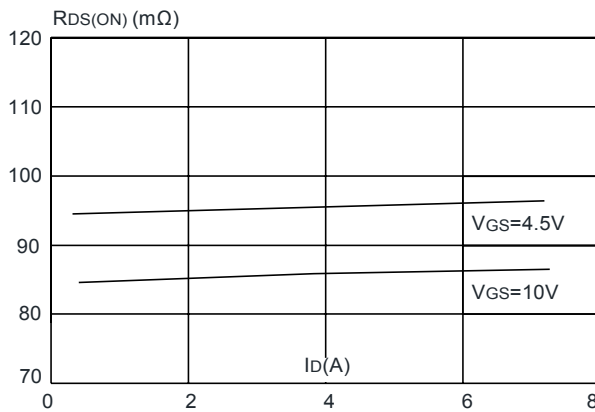


Figure 4 : Body Diode Characteristics

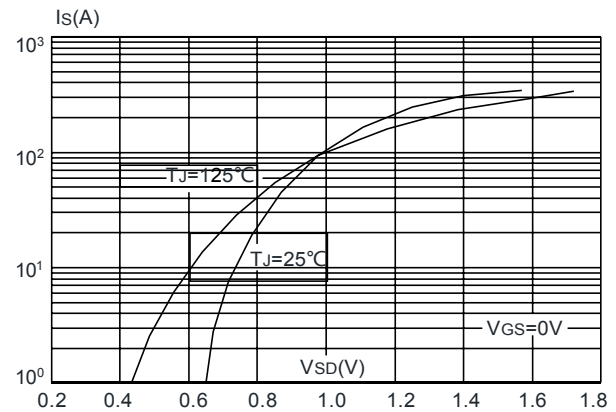


Figure 5: Gate Charge Characteristics

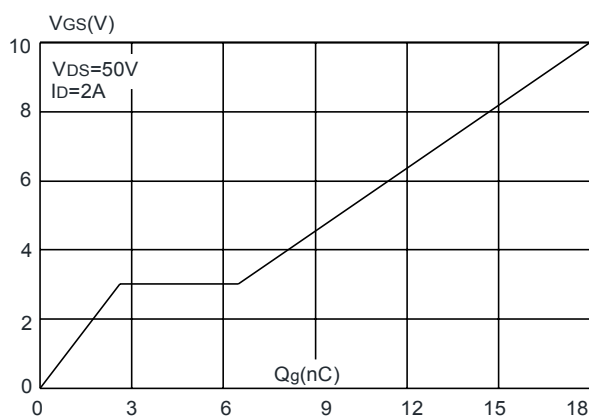
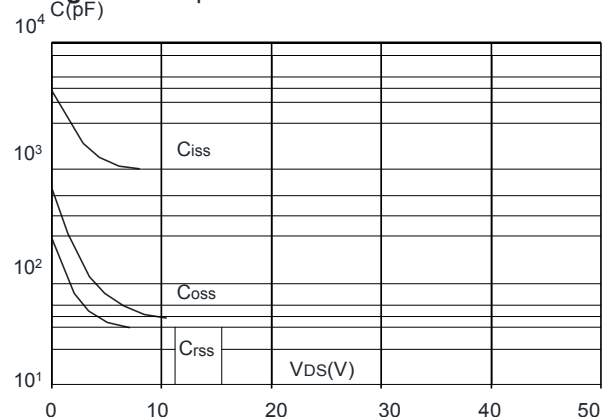


Figure 6: Capacitance Characteristics



RATING AND CHARACTERISTIC CURVES

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

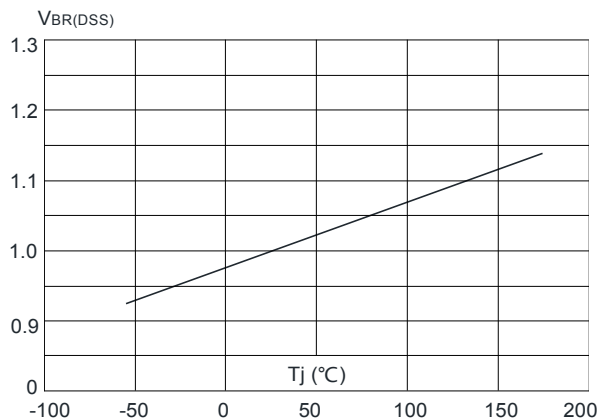


Figure 8: Normalized on Resistance vs. Junction Temperature

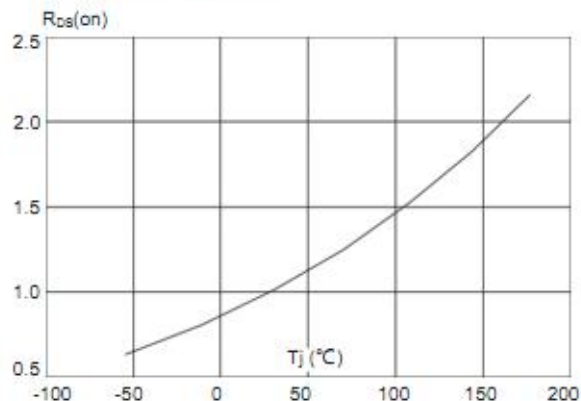


Figure 9: Maximum Safe Operating Area

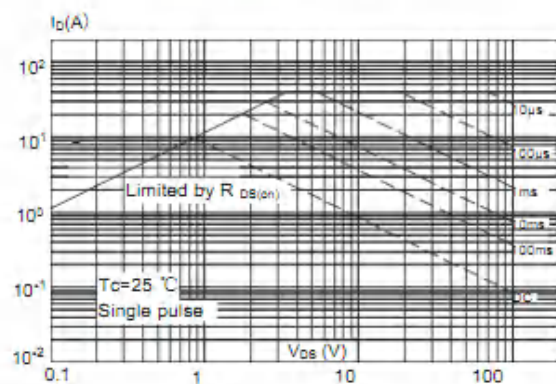


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

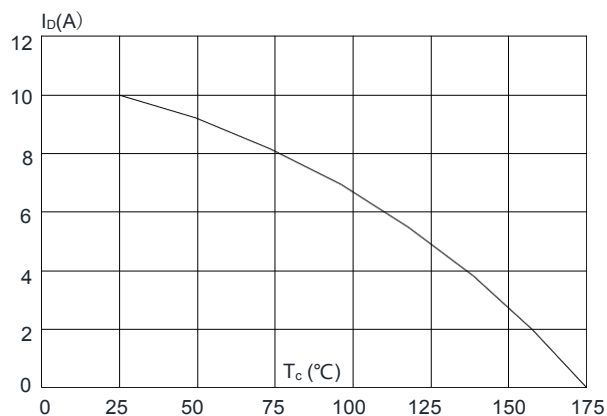
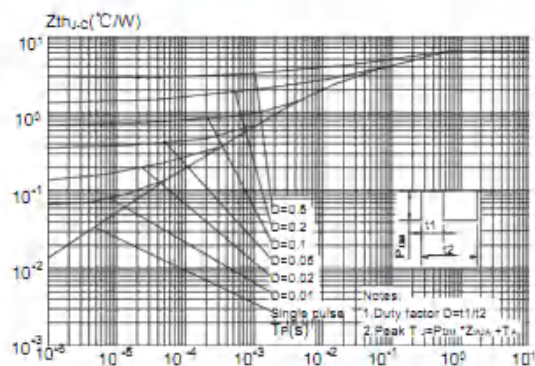
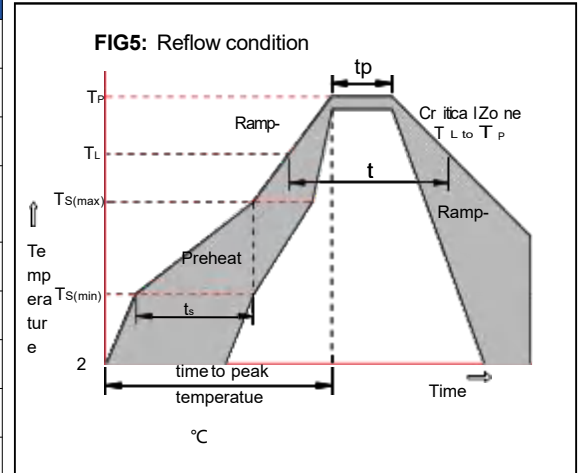


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



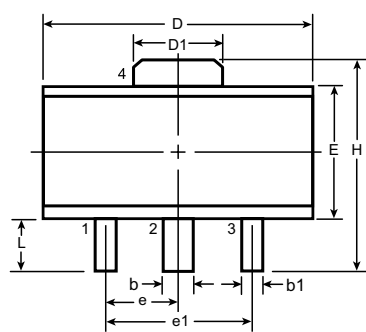
Soldering parameters

Reflow Condition		Pb-Free assembly (see as below)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150 °C
	-Temperature Max ($T_{s(max)}$)	+200 °C
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3 °C/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3 °C/sec. Max
Reflow	-Temperature (T_L) (Liquid us)	+217 °C
	-Temperature (t_L)	60-150 secs.
Peak Temp (T_P)		+260(+0/-5) °C
Time within 5 °C of actual Peak Temp (t_P)		30 secs. Max
Ramp-down Rate		6 °C/sec. Max
Time 25 °C to Peak Temp (T_P)		8 min. Max
Do not exceed		+260 °C

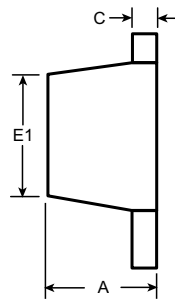


Package Dimensions & Suggested Pad Layout

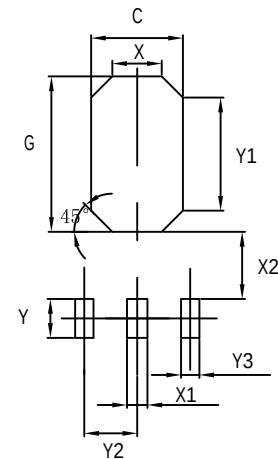
SOT89



Top View



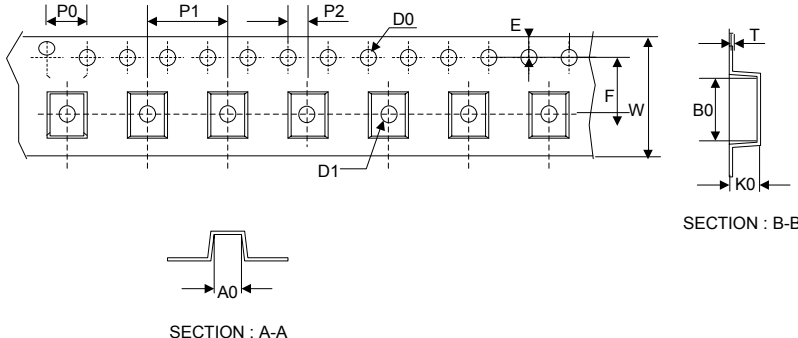
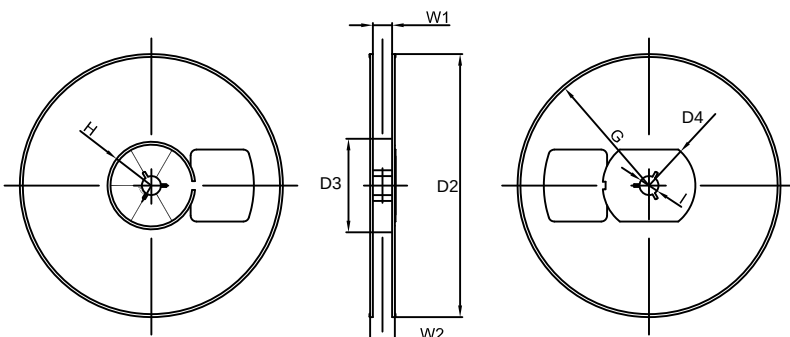
Side View



Symbol	A	b	b1	C	D	D1	E	E1	e	e1	H	L
MIN	1.40	0.44	0.36	0.3	4.40	1.50	2.29	2.00*	1.50	3.00	3.94	0.89
NOM	-	-	-	-	-	-	-	-	-	-	-	-
MAX	1.60	0.56	0.48	0.5	4.60	1.75	2.60	2.29	-	-	4.25	1.20

Dimensions	Value (in mm)
C	2.50
G	3.60
X	1.40
X1	0.90
X2	0.90
Y	1.40
Y1	2.60
Y2	1.50
Y3	0.90

Tape & reel specification

Tape		Symbol	Dimension (mm)
		P0	4.00±0.20
		P1	8.00±0.20
		P2	2.00±0.20
		D0	1.60±0.20
		D1	1.60±0.20
		E	1.75±0.20
		F	7.50±0.15
		W	16.00±0.20
		A0	6.30±0.20
		B0	8.25±0.20
		K0	2.60±0.20
		T	0.23±0.10
		D2	180.0±5.0
		D3	60Min.
13" Reel		D4	R32.0±2.0
		G	R86.5±2.0
		H	R30.0±2.0
		I	13.0±2.0
		W1	13.20±2.0
		W2	16.50±2.0
		Quantity: 1000PCS	