

- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology
- ★ 100% EAS Guaranteed

Product Summary

RoHS

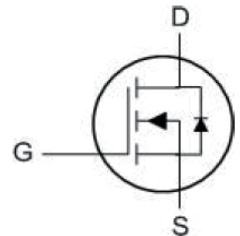
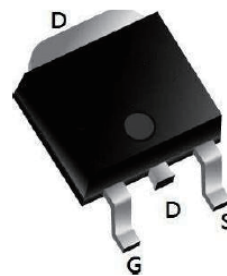
BVDSS	RDS(on)	ID
30V	3.0mΩ	120A

Description

The 120N03 is the high cell density trench N-ch MOSFETs, which provide excellent RDS(on) and gate charge for most of the synchronous buck converter applications.

The 120N03 meet the RoHS and Green Product, requirement 100% EAS guaranteed with full function reliability approved.

TO252 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		10s	Steady State	
V_{DS}	Drain-Source Voltage	30		V
V_{GS}	Gate-Source Voltage	±20		V
$I_D@T_C=25^{\circ}C$	Continuous Drain Current, $V_{GS} @ 10V^1$	120		A
$I_D@T_C=100^{\circ}C$	Continuous Drain Current, $V_{GS} @ 10V^1$	75		A
I_{DM}	Pulsed Drain Current ²	384		A
EAS	Single Pulse Avalanche Energy ³	198		mJ
I_{AS}	Avalanche Current	53.8		A
$P_D@T_C=25^{\circ}C$	Total Power Dissipation ⁴	62.5		W
$P_D@T_A=25^{\circ}C$	Total Power Dissipation ⁴	6	2.42	W
T_{STG}	Storage Temperature Range	-55 to 175		°C
T_J	Operating Junction Temperature Range	-55 to 175		°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	---	62	°C/W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹ (t ≤ 10s)	---	25	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	2.4	°C/W

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit	
Static Characteristics							
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250 A	30	-	-	V	
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =24V, V _{GS} =0V	-	-	1	A	
		T _J =85°C	-	-	30		
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250 A	1.4	1.7	2.5	V	
I _{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA	
R _{DS(ON)} ^d	Drain-Source On-state Resistance	V _{GS} =10V, I _{DS} =20A	-	3	3.8	m Ω	
		T _J =125°C	-	4.4	-		
		V _{GS} =4.5V, I _{DS} =15A	-	4	5.5		
G _{fs}	Forward Transconductance	V _{DS} =5V, I _{DS} =10A	-	24.6	-	S	
Diode Characteristics							
V _{SD} ^d	Diode Forward Voltage	I _{SD} =20A, V _{GS} =0V		-	0.8	1.1	V
t _{rr}	Reverse Recovery Time	I _{DS} =20A, dI _{SD} /dt=100A/ s		-	35.6	-	ns
t _a	Charge Time			-	19.3	-	
t _b	Discharge Time			-	16.3	-	
Q _{rr}	Reverse Recovery Charge			-	26	-	nC
Dynamic Characteristics [°]							
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz		-	1	2	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, Frequency=1.0MHz		-	2485	2971	pF
C _{oss}	Output Capacitance			-	850	-	
C _{rss}	Reverse Transfer Capacitance			-	85	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =15V, R _L =15 , I _{DS} =1A, V _{GBN} =10V, R _G =6		-	12.4	23	ns
t _r	Turn-on Rise Time			-	9.5	18	
t _{d(OFF)}	Turn-off Delay Time			-	27.2	49	
t _f	Turn-off Fall Time			-	35.2	64	
Gate Charge Characteristics [°]							
Q _g	Total Gate Charge	V _{DS} =15V, V _{GS} =10V, I _{DS} =20A		-	20.6	28.8	nC
Q _g	Total Gate Charge	V _{DS} =15V, V _{GS} =4.5V, I _{DS} =20A		-	9.8	-	
Q _{gth}	Threshold Gate Charge			-	1.8	-	
Q _{gs}	Gate-Source Charge			-	3.8	-	
Q _{gd}	Gate-Drain Charge			-	3.7	-	

Note d: Pulse test ; pulse width $\leq 300\text{ms}$, duty cycle $\leq 2\%$.

Note e: Guaranteed by design, not subject to production testing.

Typical Electrical and Thermal Characteristics (Curves)

Figure1: Power Dissipation

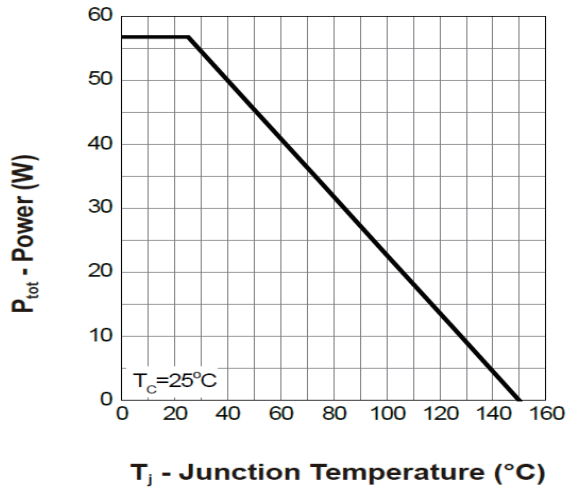


Figure 2: Drain Current

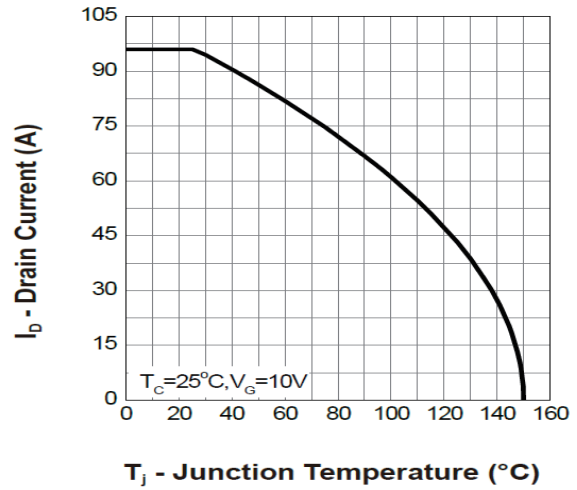


Figure 3: Safe Operation Area

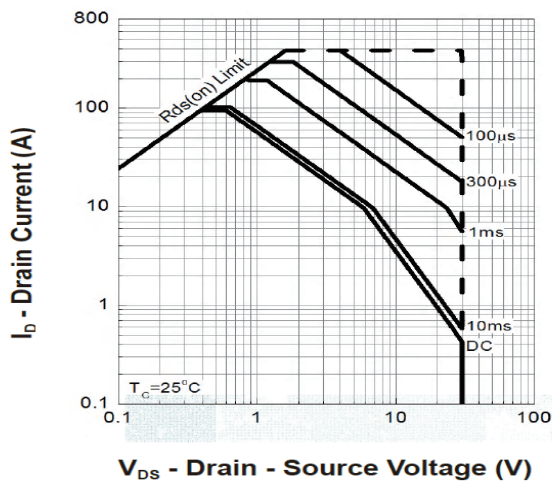


Figure 4: Thermal Transient Impedance

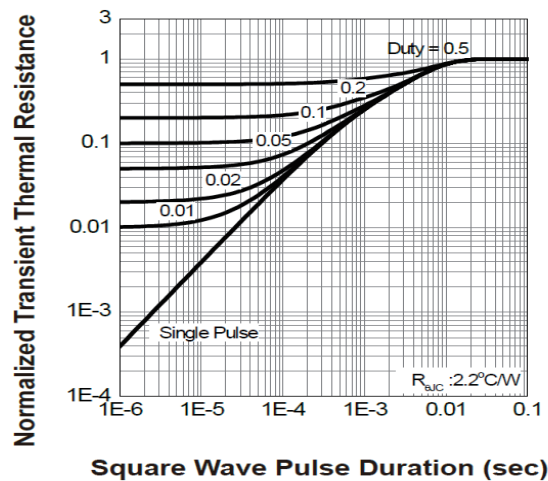


Figure 5: Safe Operation Area

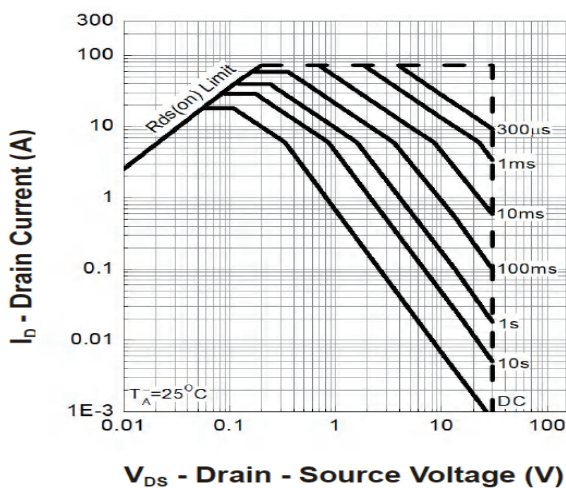
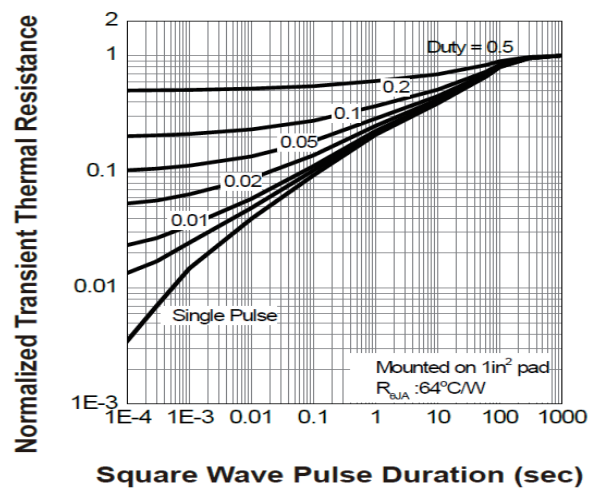


Figure 6: Thermal Transient Impedance



Typical Performance Characteristics

Figure 7: Output Characteristics

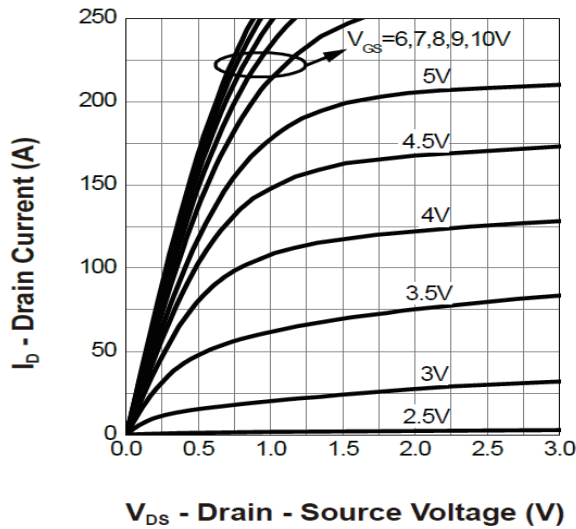


Figure 8: Drain-Source On Resistance

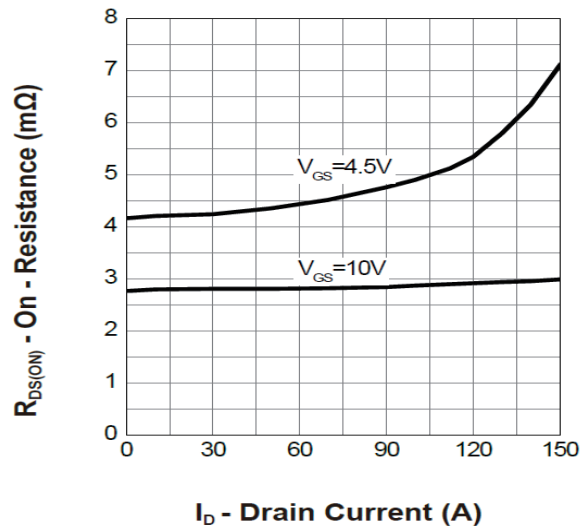


Figure 9: Gate-Source On Resistance

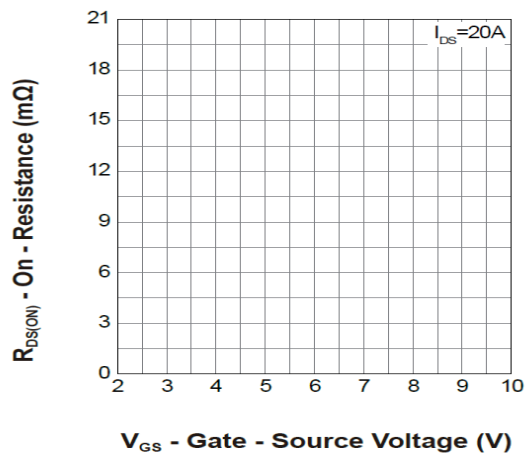


Figure 10: Gate Threshold Voltage

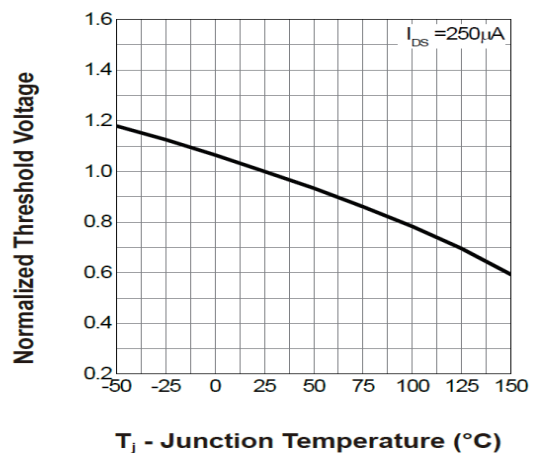


Figure 11: Drain-Source On Resistance

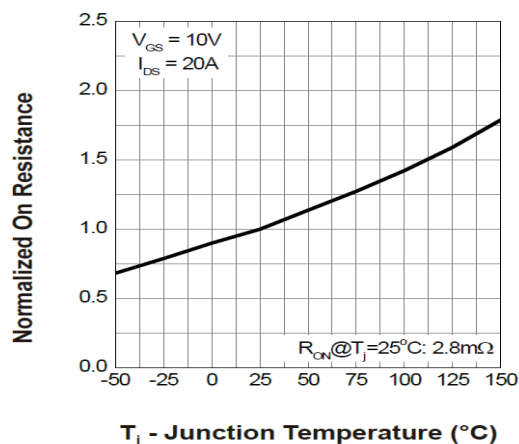
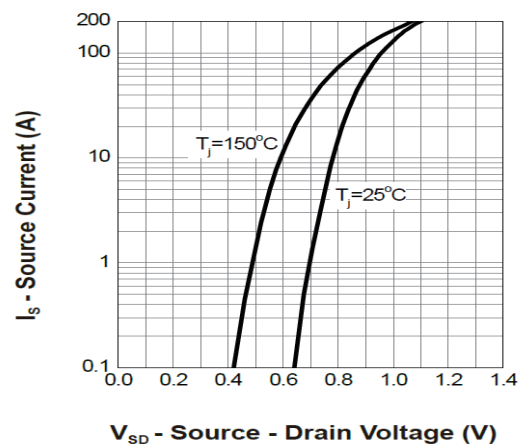


Figure 12: Source-Drain Diode Forward



Typical Operating Characteristics(Cont.)

Figure 13: Capacitance

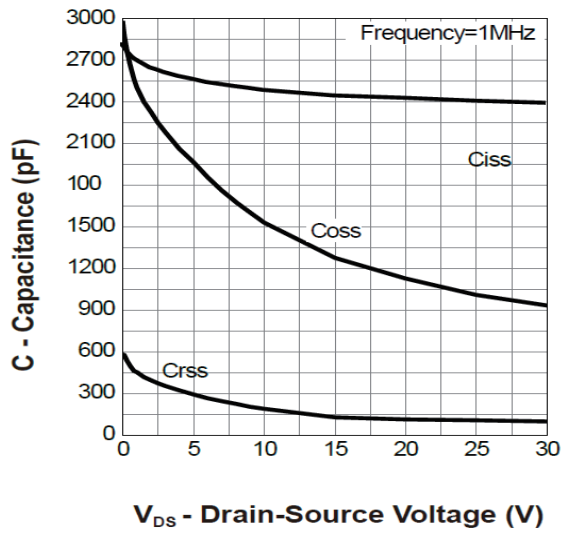
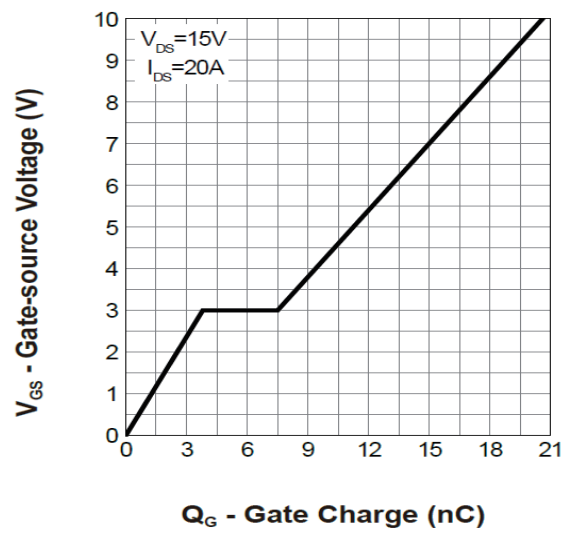
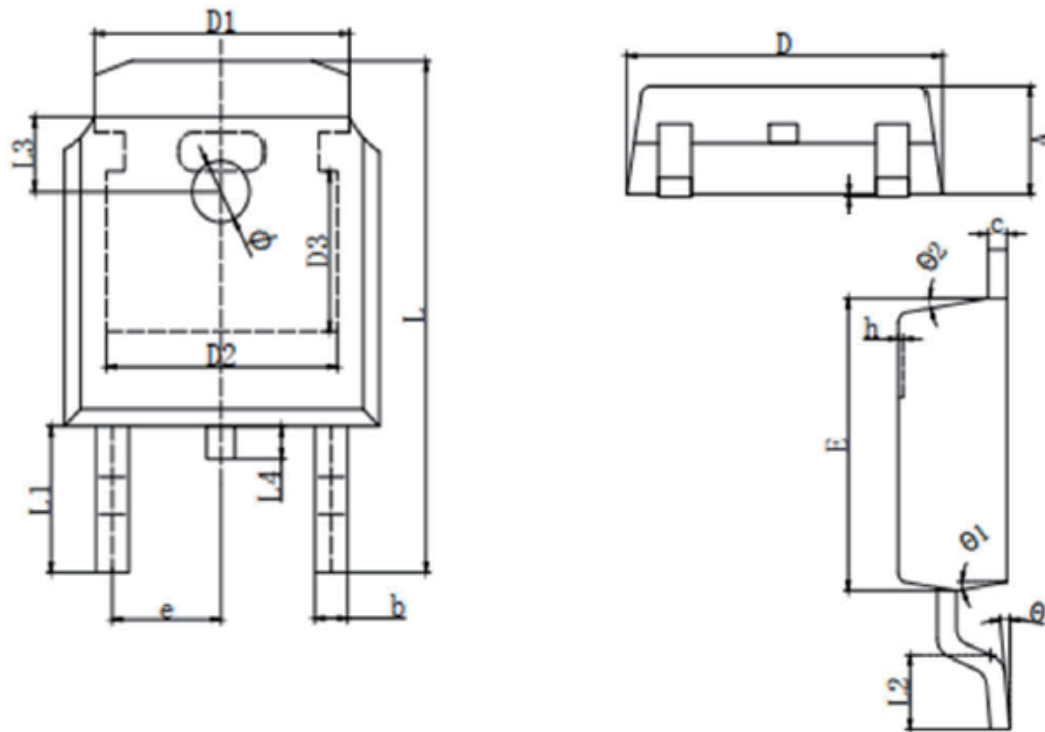


Figure 14: Gate Charge



TO-252 Package outline



Symbol	MILLMETER		Symbol	MILLMETER	
	MIN	MAX		MIN	MAX
A	2.2	2.4	h	0	0.2
A1	0	0.127	L	9.9	10.3
b	0.64	0.74	L1	2.888REF	
c	0.46	0.58	L2	1.4	1.7
D	6.5	6.7	L3	1.6REF	
D1	5.334REF		L4	0.6	1
D2	4.826REF		φ	1.1	1.3
D3	3.166REF		θ	0°	8°
E	6	6.2	θ 1	9° TYP2	
e	2.286TYP		θ 2	9° TYP	