

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

Product Summary

RoHS

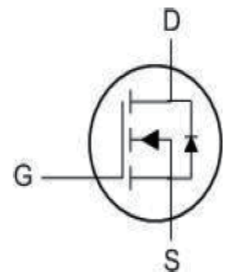
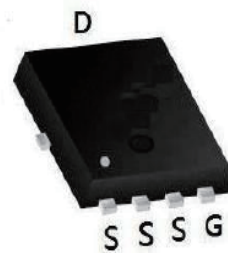
BVDSS	RDSON	ID
40V	11mΩ	45A

Description

The 50N04F is the high cell density trenched N ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The 50N04F meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

PDFN5X6 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS}@ 10V^1$	45	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS}@ 10V^1$	25	A
I_{DM}	Pulsed Drain Current ²	80	A
EAS	Single Pulse Avalanche Energy ³	19	mJ
I_{AS}	Avalanche Current	30	A
$P_D@T_C=25^\circ C$	Total Power Dissipation ⁴	20	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient (Steady State) ¹	---	55	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	4.32	$^\circ C/W$

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

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Units
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	40	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =40V, V _{GS} =0V	-	-	1	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics ^(Note 3)						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1	1.5	2	V
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =10V, I _D =8A	-	11	16	mΩ
		V _{GS} =4.5V, I _D =4A	-	18.9	24	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =8A	33	-	-	S
Dynamic Characteristics ^(Note4)						
C _{ISS}	Input Capacitance	V _{DS} =20V, V _{GS} =0V, F=1.0MHz	-	964	-	PF
C _{OSS}	Output Capacitance		-	109	-	PF
C _{RSS}	Reverse Transfer Capacitance		-	96	-	PF
Switching Characteristics ^(Note 4)						
t _{d(on)}	Turn-on Delay Time	V _{DD} =20V, R _L =2.5Ω	-	5.5	-	nS
t _r	Turn-on Rise Time		-	14	-	nS
t _{d(off)}	Turn-Off Delay Time	V _{GS} =10V, R _{GEN} =3Ω	-	24	-	nS
t _f	Turn-Off Fall Time		-	12	-	nS
Q _g	Total Gate Charge	V _{DS} =20V, I _D =8A, V _{GS} =10V	-	22.9	-	nC
Q _{gs}	Gate-Source Charge		-	3.5	-	nC
Q _{gd}	Gate-Drain Charge		-	5.3	-	nC
Drain-Source Diode Characteristics						
V _{SD}	Diode Forward Voltage ^(Note 3)	V _{GS} =0V, I _S =9A	-	0.8	1.2	V

Notes:

- 1.Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

N-Channel Typical Electrical and Thermal Characteristics (Curves)

Figure1: Switching Test Circuit

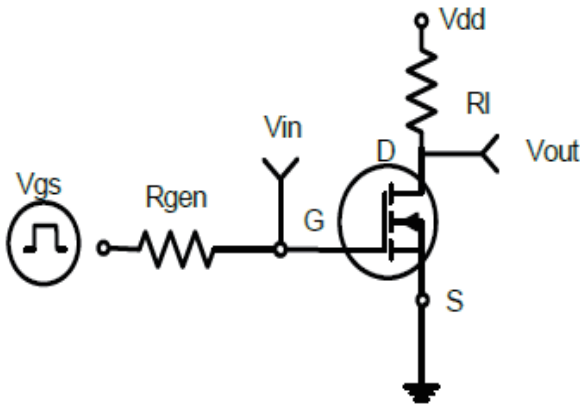


Figure 2: Switching Waveforms

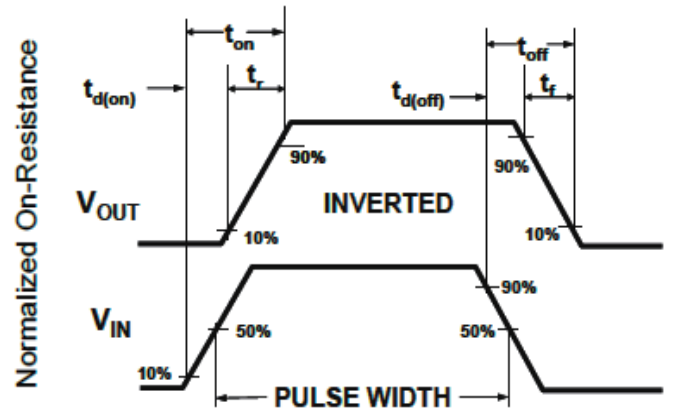


Figure 3:Output Characteristics

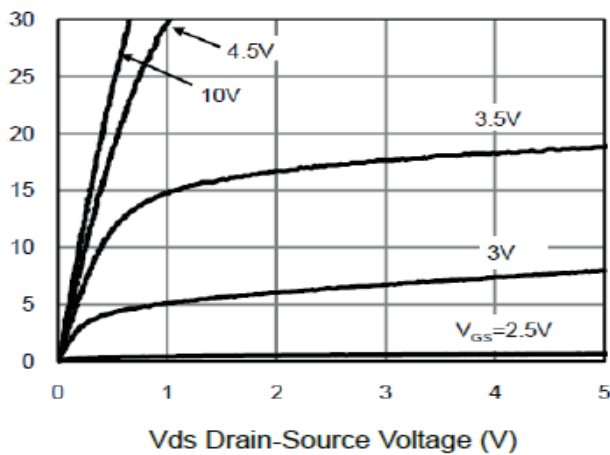


Figure 4: Transfer Characteristics

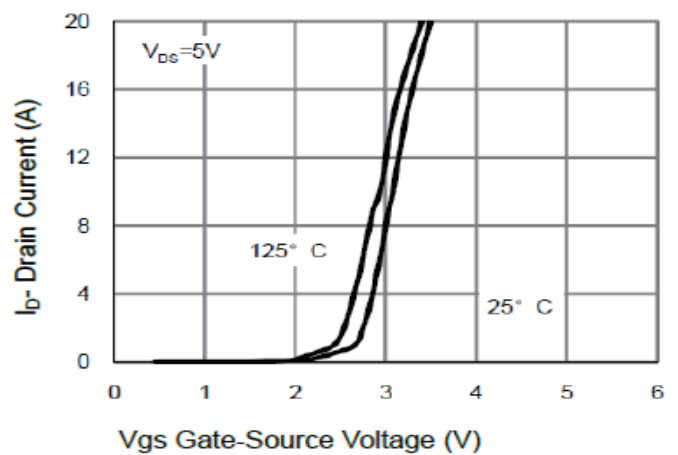


Figure 5: Drain-Source On-Resistance

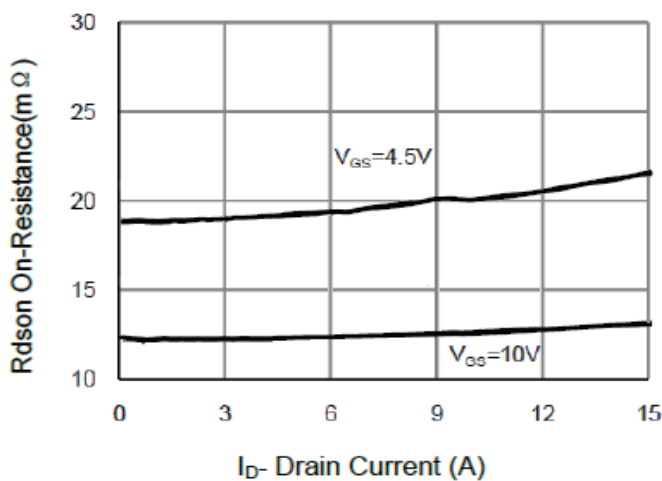
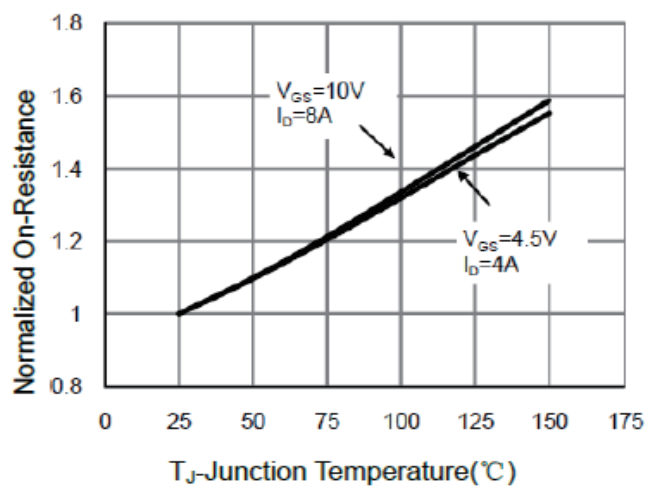


Figure 6: Drain-Source On-Resistance



Typical Performance Characteristics

Figure 7: $R_{ds(on)}$ vs V_{gs}

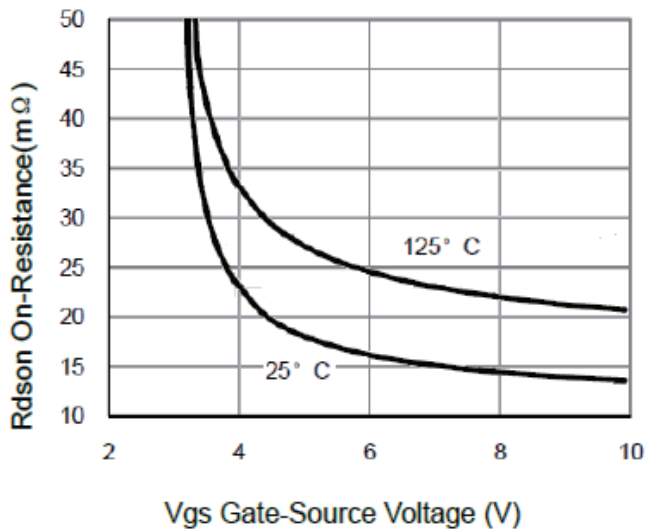


Figure 8: Power Dissipation

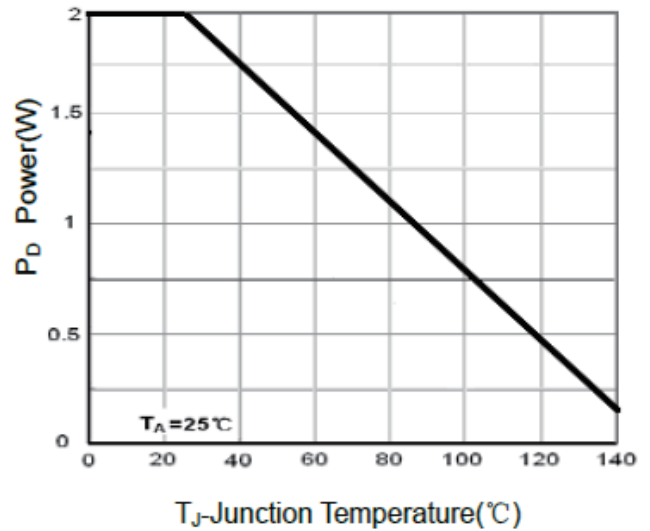


Figure 9: Gate Charge

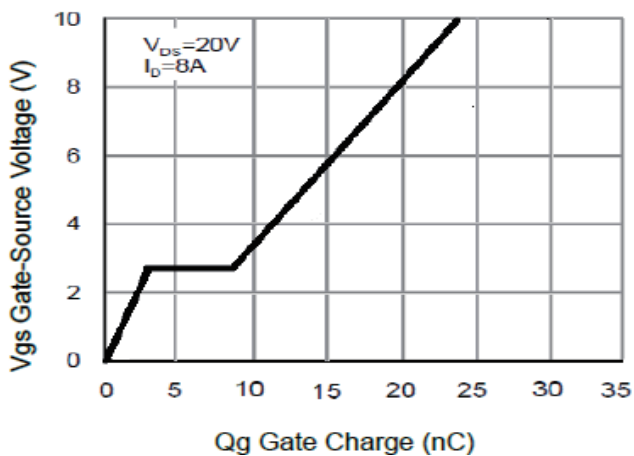


Figure 10: Source- Drain Diode Forward

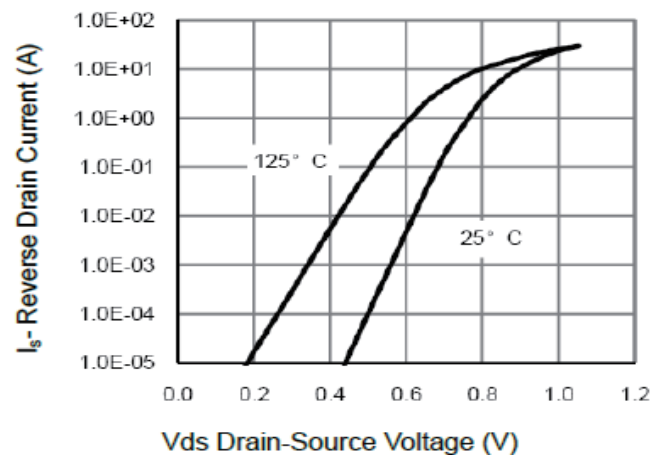


Figure 11: Capacitance vs V_{ds}

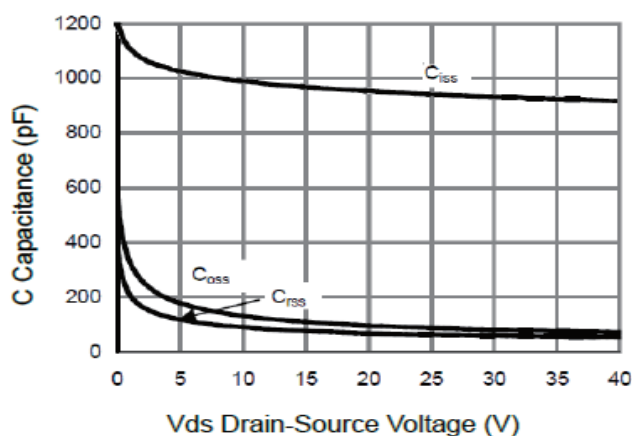
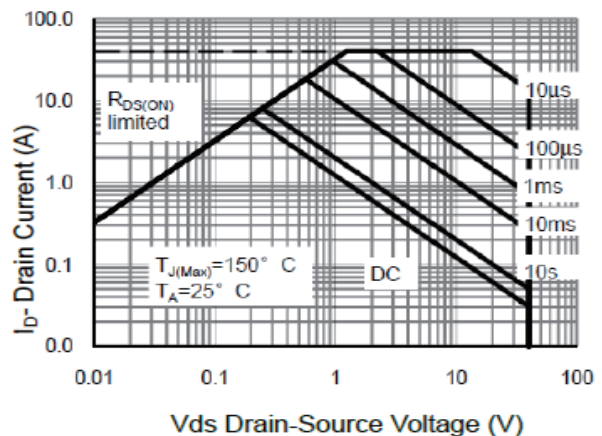
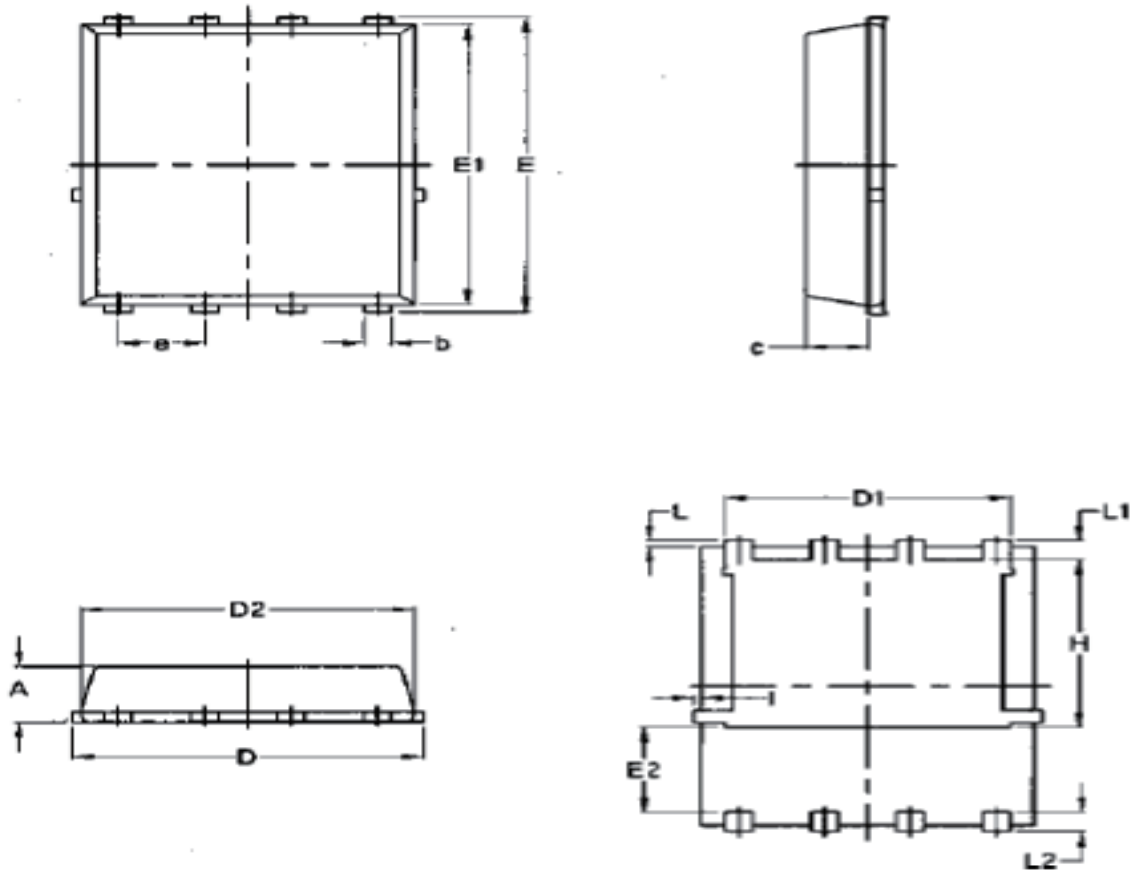


Figure 12: Safe Operation Area



Package Mechanical Data-DFN5*6-8L-JQ Single



Symbol	Common			
	mm		Inch	
	Mim	Max	Min	Max
A	1.03	1.17	0.0406	0.0461
b	0.34	0.48	0.0134	0.0189
c	0.824	0.0970	0.0324	0.082
D	4.80	5.40	0.1890	0.2126
D1	4.11	4.31	0.1618	0.1697
D2	4.80	5.00	0.1890	0.1969
E	5.95	6.15	0.2343	0.2421
E1	5.65	5.85	0.2224	0.2303
E2	1.60	/	0.0630	/
e	1.27 BSC		0.05 BSC	
L	0.05	0.25	0.0020	0.0098
L1	0.38	0.50	0.0150	0.0197
L2	0.38	0.50	0.0150	0.0197
H	3.30	3.50	0.1299	0.1378
I	/	0.18	/	0.0070