

Features

Low Gate Charge
High Power and current handling capability
Lead free product is acquired

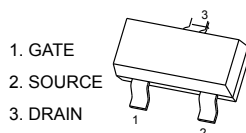
V_{DS} 40 V
 I_D 8 A
 $R_{DS(ON)}$ 21m Ω

Applications

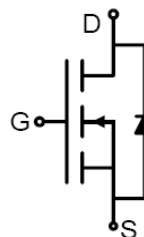
PWM Applications
Load Switch
Power Management

8N04

SOT-23



Equivalent Circuit



MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

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

Symbol	Parameter	Limit	Unit
V_{DS}	Drain-Source Voltage ($V_{GS}=0V$)	40	V
V_{GS}	Gate-Source Voltage ($V_{DS}=0V$)	± 20	V
I_D	Drain Current-Continuous($T_A=25^\circ\text{C}$)	8	A
	Drain Current-Continuous($T_A=100^\circ\text{C}$)	3.4	A
I_{DM} (pluse)	Drain Current-Continuous@ Current-Pulsed (Note 1)	21.6	A
P_D	Maximum Power Dissipation($T_A=25^\circ\text{C}$)	1.5	W
	Maximum Power Dissipation($T_A=100^\circ\text{C}$)	0.6	W
E_{AS}	Avalanche energy (Note 2)	25	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 150	$^\circ\text{C}$

Thermal Characteristic

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient		85	$^\circ\text{C/W}$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
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 T _J =25°C			1	μA
		V _{DS} =40V, V _{GS} =0V T _J =125°C			100	μA
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 =250μA	1		2.5	V
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =3A		6.5		S
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =10V, I _D =3A T _J =25°C		21	29.6	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =4.5V, I _D =2A T _J =25°C		30	39.9	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =20V,V _{GS} =0V, f=1.0MHz		631		pF
C _{oss}	Output Capacitance			54		pF
C _{rss}	Reverse Transfer Capacitance			39		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1.0MHz		1.6		Ω
Switching Parameters						
t _{d(on)}	Turn-on Delay Time	V _{GS} =10V, V _{DS} =20V, R _L =5Ω, R _{GEN} =3Ω		6		nS
t _r	Turn-on Rise Time			4		nS
t _{d(off)}	Turn-Off Delay Time			20		nS
t _f	Turn-Off Fall Time			3		nS
Q _g	Total Gate Charge	V _{GS} =10V, V _{DS} =20V, I _D =3A		14		nC
Q _{gs}	Gate-Source Charge			2.5		nC
Q _{gd}	Gate-Drain Charge			3		nC
Source-Drain Diode Characteristics						
I _{SD}	Source-Drain Current (Body Diode)				8	A
V _{SD}	Forward on Voltage (Note 3)	V _{GS} =0V, I _S =3A			1.2	V
t _{rr}	Reverse Recovery Time	I _F =3A, dI/dt=100A/μs		9		ns
Q _{rr}	Reverse Recovery Charge	I _F =3A, dI/dt=100A/μs		4		nC

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature.

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

Notes 3.Repetitive Rating: Pulse width limited by maximum junction temperature.

RATING AND CHARACTERISTIC CURVES

Figure 1. Output Characteristics

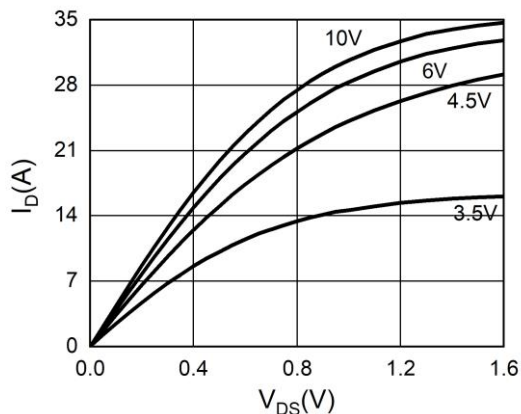


Figure 2. Transfer Characteristics

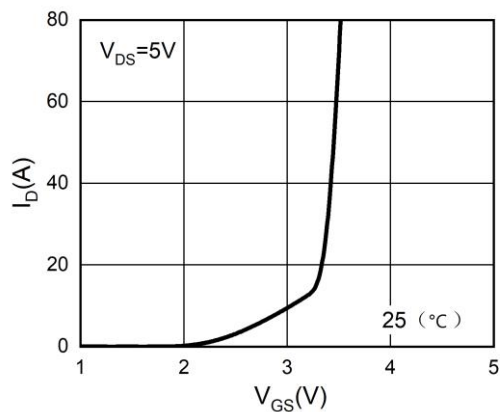


Figure 3. Power Dissipation

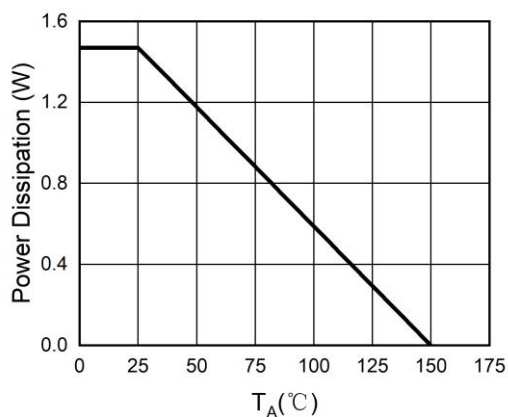


Figure 4. Drain Current

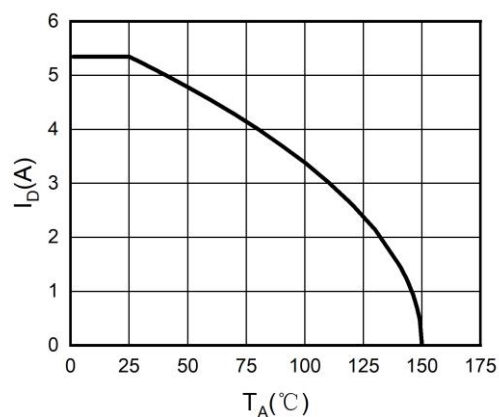


Figure 5. BV_{DSS} vs Junction Temperature

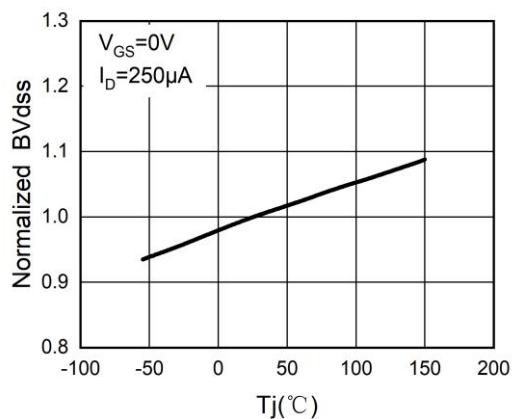
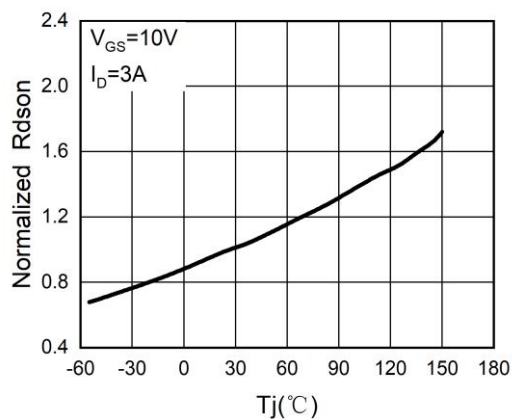


Figure 6. $R_{DS(ON)}$ vs Junction Temperature



RATING AND CHARACTERISTIC CURVES

Figure 7. Gate Charge Waveforms

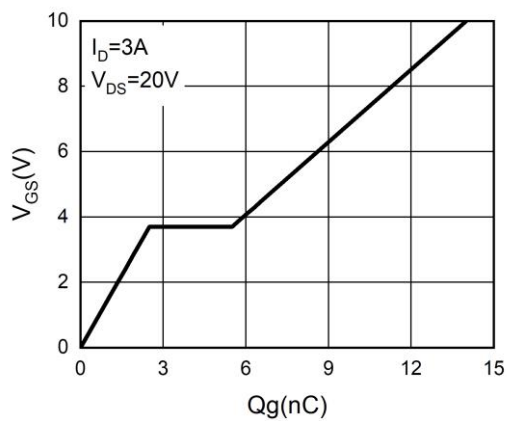


Figure 8. Capacitance

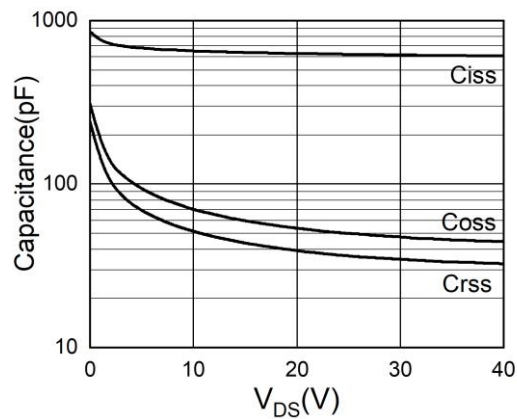


Figure 9. Body-Diode Characteristics

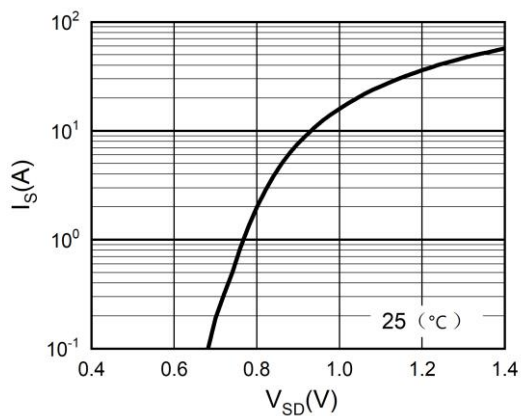
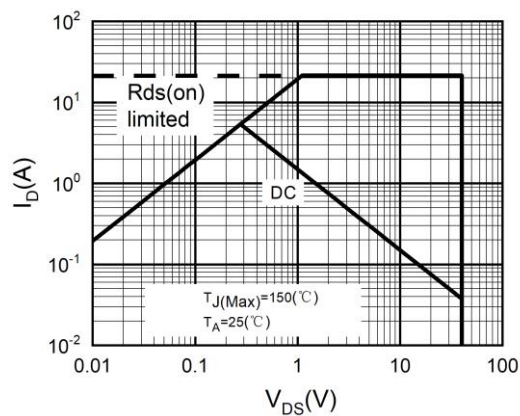
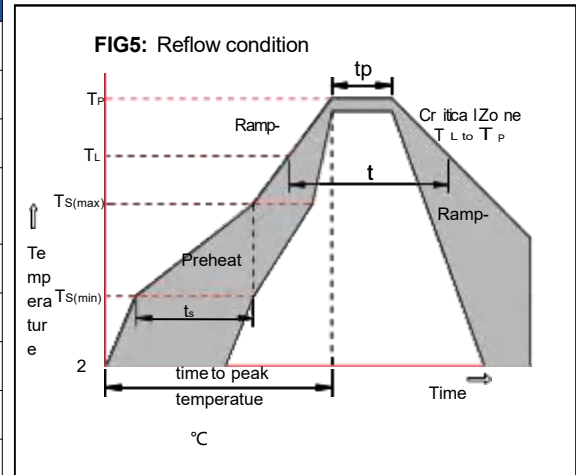


Figure 10. Maximum Safe Operating Area



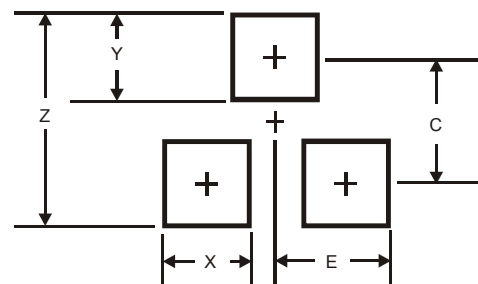
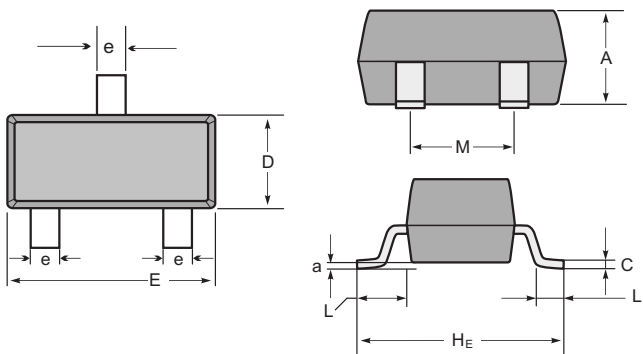
Soldering parameters

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

SOT23



SOT-23 mechanical data

UNIT	A	C	D	E	H _E	e	M	L	L ₁	a
mm	max	1.1	0.15	1.4	3.0	2.6	0.5	1.95	0.55 (ref)	0.36 (ref)
	min	0.9	0.08	1.2	2.8	2.2	0.3	1.7		0.15
mil	max	43	6	55	118	102	20	77	22 (ref)	14 (ref)
	min	35	3	47	110	87	12	67		6

Dimensions	SOT23
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

Tape & reel specification

Tape

Technical drawing of a tape component. The top view shows a series of rectangular segments with circular features. Dimensions include: $P0$, $P2$, $P1$ (pitch dimensions); $\varnothing D0$, $\varnothing D1$ (diameters); E , F , W (widths); and $A0$ (segment width). The side view, labeled 'SECTION : B-B', shows the profile of the tape with dimensions T (thickness), $B0$ (height), and $K0$ (width). The bottom view, labeled 'SECTION : A-A', shows the cross-section of the tape with dimension $A0$.

7" Reel

Technical drawing of a 7-inch reel. The top view shows a circular reel with a central hub and dimensions $D4$ (outer diameter), G (inner diameter), and $D3$ (hub diameter). The side view shows the reel's profile with dimensions $D2$ (height), $D3$ (hub height), and $W1$ (width).

Symbol	Dimension (mm)
P0	4.00±0.10
P1	4.00±0.10
P2	2.00±0.10
D0	1.55±0.10
D1	1.05±0.10
E	1.55±0.10
F	3.60±0.10
W	8.00±0.10
A0	3.80±0.20
B0	3.25±0.20
K0	1.45±0.10
T	0.25±0.05
D2	178.0±3.0
D3	55Min.
D4	R24.0±3.0
G	R82.0±3.0
I	13.0±2.0
W1	11.0±3.0
Quantity: 3000PCS	