

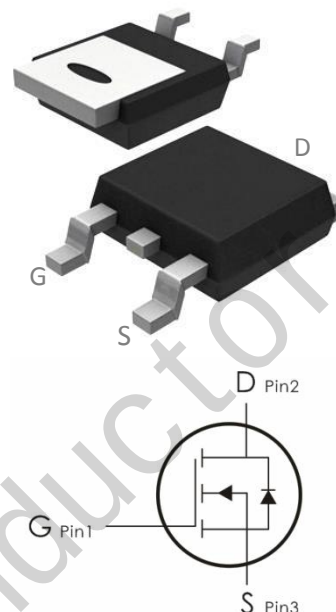
Description:

This N-Channel MOSFET uses advanced trench technology and design to provide excellent $R_{DS(on)}$ with low gate charge.

It can be used in a wide variety of applications.

Features:

- 1) $V_{DS}=40V, I_D=120A, R_{DS(on)} < 4m\Omega @ V_{GS}=10V$
- 2) Low gate charge.
- 3) Green device available.
- 4) Advanced high cell density trench technology for ultra $R_{DS(on)}$.
- 5) Excellent package for good heat dissipation.



Absolute Maximum Ratings: ($T_C=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current- $T_C=25^\circ C$	120	A
	Continuous Drain Current- $T_C=100^\circ C$	85	
	Pulsed Drain Current ¹	330	
E_{AS}	Single Pulse Avalanche Energy	1080	mJ
P_D	Power Dissipation, $T_C=25^\circ C$	120	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ C$

Thermal Characteristics:

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.25	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	---	

Package Marking and Ordering Information:

Part NO.	Marking	Package
IPD80N04S3-06	QN0406	TO-252

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	45	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS}=40V, V_{DS}=20V$	---	---	1	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0A$	---	---	± 100	nA
On Characteristics						
$V_{GS(th)}$	GATE-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	1.8	2.5	V
$R_{DS(on)}$	Drain-Source On Resistance ³	$V_{GS}=10V, I_D=20A$	---	3.6	4	m Ω
		$V_{GS}=4.5V, I_D=10A$	---	5.8	7	
G_{FS}	Forward Transconductance	$V_{DS}=10V, I_D=20A$	26	---	---	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=20V, V_{GS}=0V, f=1MHz$	---	5400	---	pF
C_{oss}	Output Capacitance		---	970	---	
C_{rss}	Reverse Transfer Capacitance		---	380	---	
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time ³	$V_{DD}=20V, I_D=20A,$ $V_{GS}=10V, R_{GEN}=3\Omega$	---	15	---	ns
t_r	Rise Time ^{2,3}		---	18	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	52	---	ns
t_f	Fall Time ^{2,3}		---	23	---	ns
Q_g	Total Gate Charge ³	$V_{GS}=10V, V_{DS}=20V,$ $I_D=20A$	---	75	---	nC
Q_{gs}	Gate-Source Charge		---	10.5	---	nC
Q_{gd}	Gate-Drain “Miller” Charge		---	17	---	nC
Drain-Source Diode Characteristics						
V_{SD}	Source-Drain Diode Forward Voltage ³	$V_{GS}=0V, I_S=40A$	---	---	1.2	V

Ls	Diode Forward Current(Note 2)		---	---	120	A
Qrr	Reverse Recovery Time	$T_J = 25^{\circ}\text{C}, I_F = 40\text{A}$ $di/dt = 100\text{A/s}$ (Note3)	---	42	---	Ns
trr	Reverse Recovery Charge		---	45	---	nc

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. E_{AS} condition : $T_J=25^{\circ}\text{C}, V_{DD}=20\text{V}, V_G=10\text{V}, L=1\text{mH}, R_g=25\Omega, I_{AS}=46.5\text{A}$

Typical Characteristics: ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

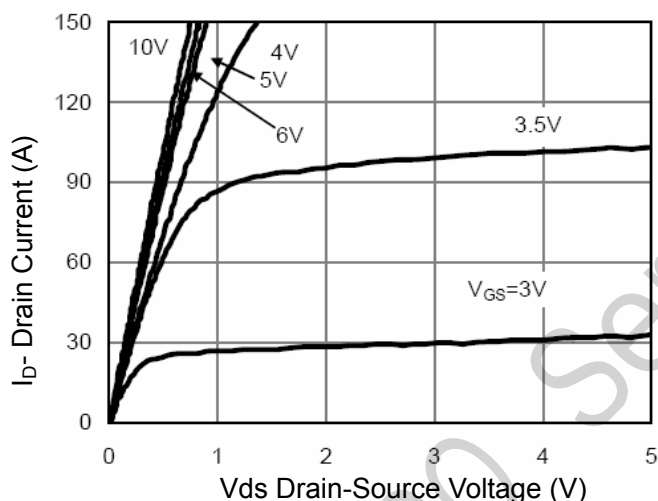


Figure 1 Output Characteristics

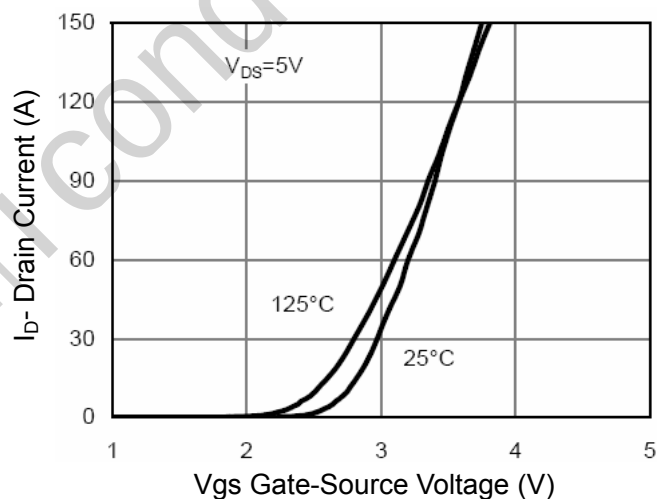


Figure 2 Transfer Characteristics

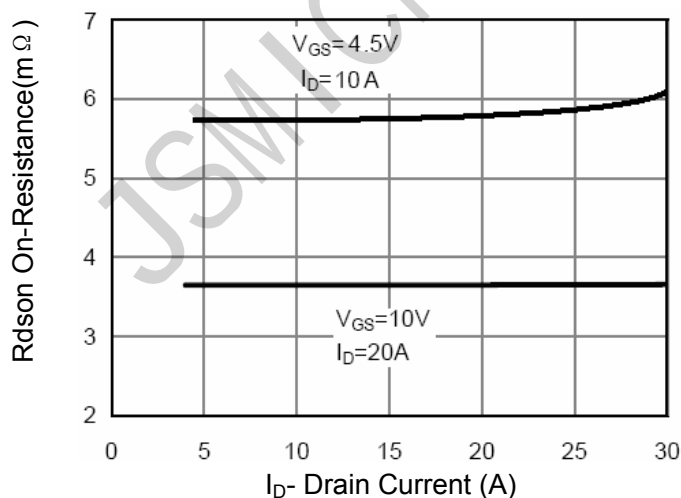


Figure 3 Rdson- Drain Current

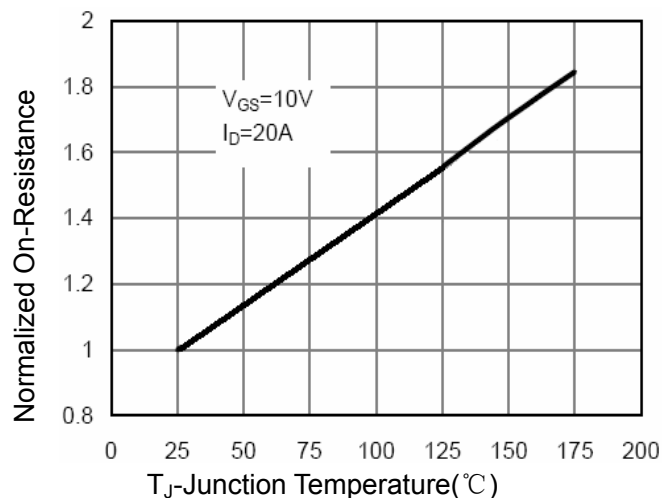


Figure 4 Rdson-Junction Temperature

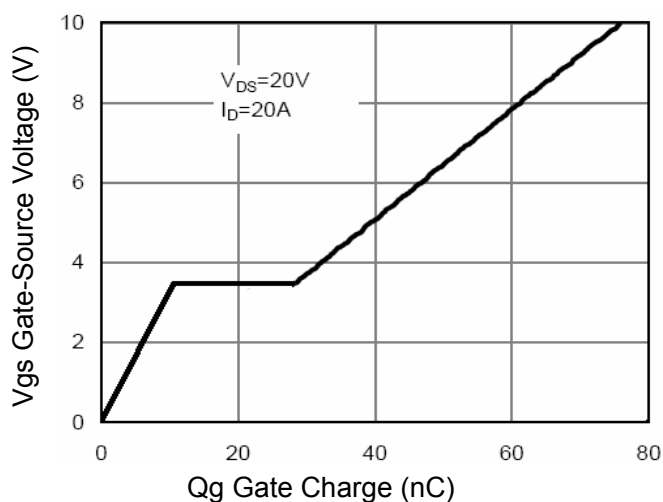


Figure 5 Gate Charge

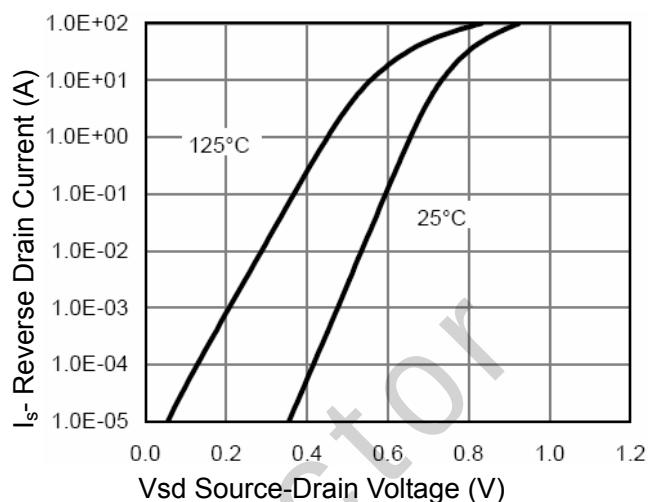


Figure 6 Source- Drain Diode Forward

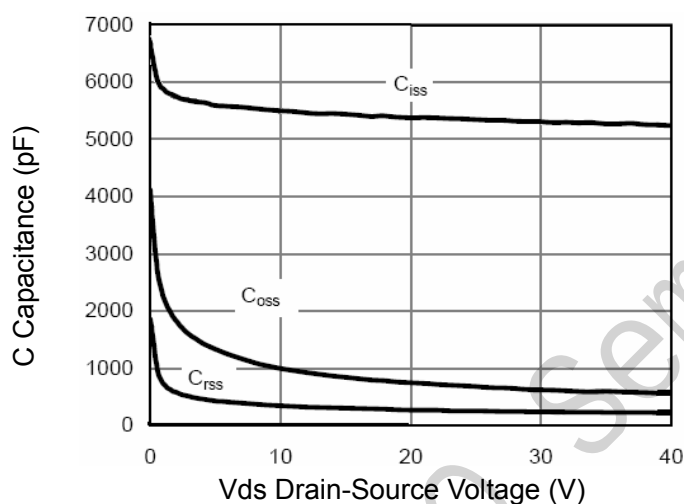


Figure 7 Capacitance vs Vds

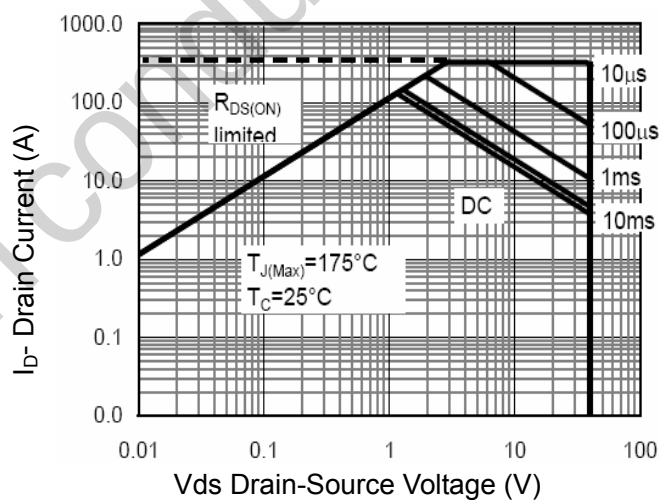


Figure 8 Safe Operation Area

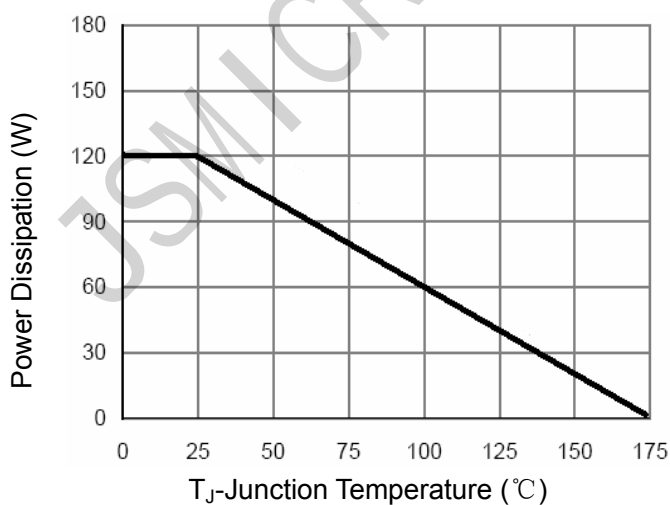


Figure 9 Power De-rating

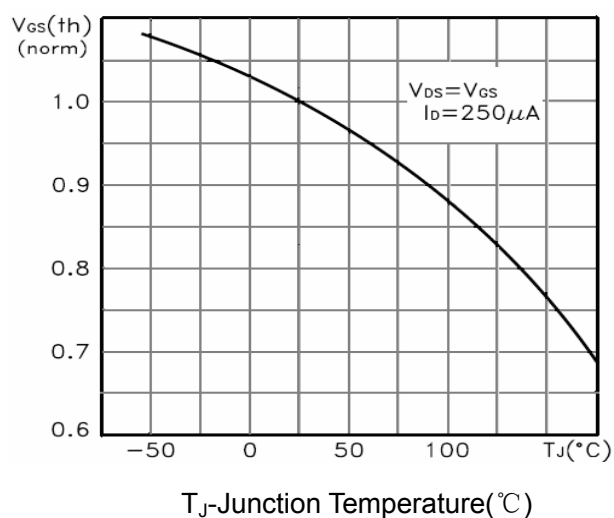


Figure 10 $V_{GS(th)}$ vs Junction Temperature

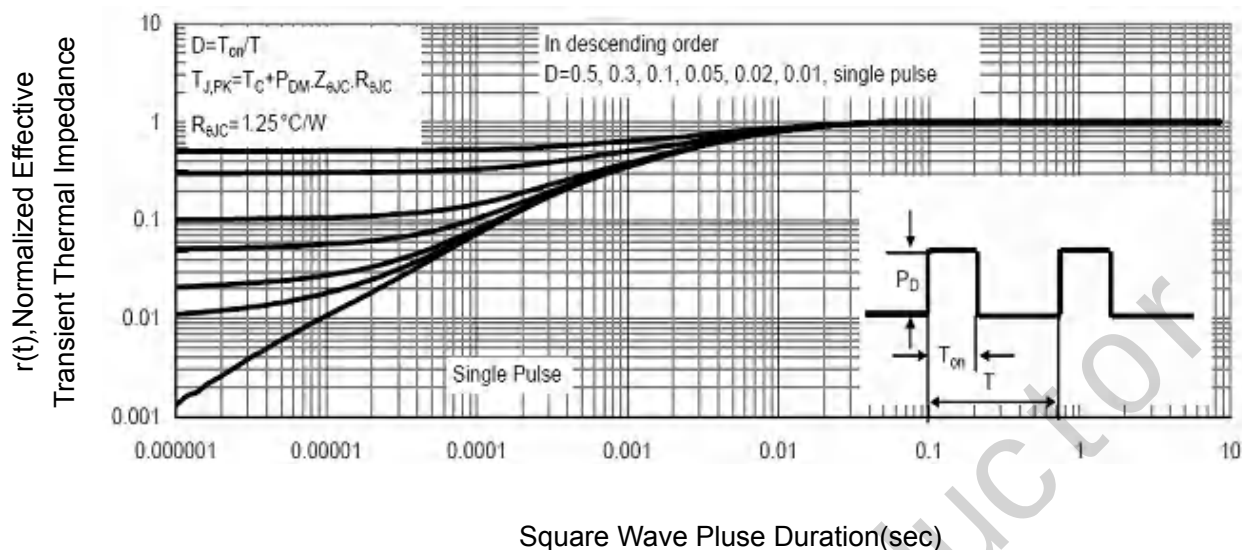
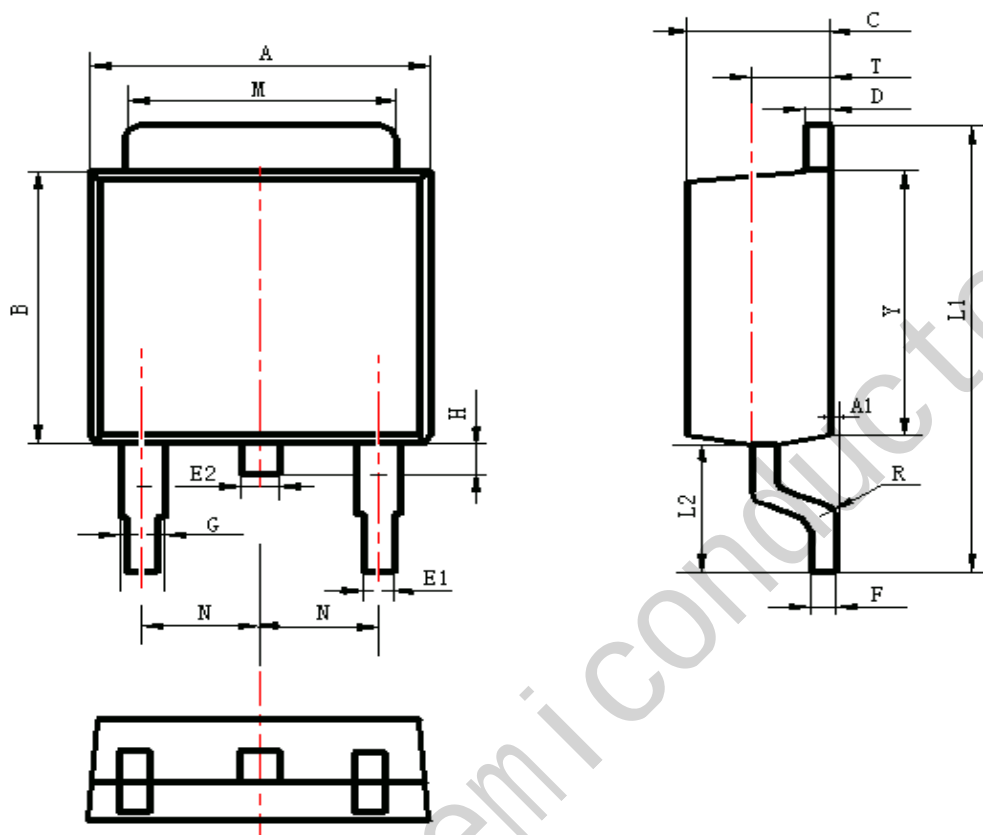


Figure 11 Normalized Maximum Transient Thermal Impedance

Package Outline: TO-252



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	6.30	6.90	0.248	0.272
A1	0.00	0.16	0.000	0.006
B	5.70	6.30	0.224	0.248
C	2.10	2.50	0.083	0.098
D	0.30	0.70	0.012	0.028
E1	0.60	0.90	0.024	0.035
E2	0.70	1.00	0.028	0.039
F	0.30	0.60	0.012	0.024
G	0.70	1.20	0.028	0.047
L1	9.60	10.50	0.378	0.413
L2	2.70	3.10	0.106	0.122
H	0.40	1.00	0.016	0.039
M	5.10	5.50	0.201	0.217
N	2.09	2.49	0.082	0.098
R	0.30		0.012	
T	1.40	1.60	0.055	0.063
Y	5.10	6.30	0.201	0.248