

### General Description

The 40N03B is N-channel MOSFET device that features a low on-state resistance and excellent switching characteristics, and designed for low voltage high current applications such as DC/DC converter with synchronous rectifier.

### Features

- Simple Drive Requirement
- Low Gate Charge
- Fast Switching
- Ultra-Low RDS(on)
- Green Device Available

### Product Summary

BVDSS	RDSON	ID
30V	20mΩ	36A

### Applications

- CPU Power Delivery
- DC/DC converter
- Switching applications

### TO-252/251 Pin Configuration



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_c = 25^\circ\text{C}$	Continuous Drain Current <sup>1</sup>	36	A
$I_D @ T_c = 100^\circ\text{C}$	Continuous Drain Current	25	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	144	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	36	mJ
$P_D @ T_c = 25^\circ\text{C}$	Total Power Dissipation	45	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	---	45	°C/W
$R_{\theta JC}$	Thermal Resistance Junction -Case	---	2.5	°C/W

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$\text{BV}_{\text{DSS}}$	Drain-Source Breakdown Voltage	$\text{V}_{\text{GS}}=0\text{V}$ , $\text{I}_D=250\text{uA}$	30	---	---	V
$\text{R}_{\text{DS(ON)}}$	Static Drain-Source On-Resistance	$\text{V}_{\text{GS}}=10\text{V}$ , $\text{I}_D=10\text{A}$	---	---	20	$\text{m}\Omega$
		$\text{V}_{\text{GS}}=4.5\text{V}$ , $\text{I}_D=8\text{A}$	---	---	42	$\text{m}\Omega$
$\text{V}_{\text{GS(th)}}$	Gate Threshold Voltage	$\text{V}_{\text{GS}}=\text{V}_{\text{DS}}$ , $\text{I}_D=250\text{uA}$	1	---	3	V
$\text{I}_{\text{DSS}}$	Drain-Source Leakage Current	$\text{V}_{\text{DS}}=24\text{V}$ , $\text{V}_{\text{GS}}=0\text{V}$ , $T_J=25^\circ\text{C}$	---	---	1	$\text{uA}$
		$\text{V}_{\text{DS}}=24\text{V}$ , $\text{V}_{\text{GS}}=0\text{V}$ , $T_J=125^\circ\text{C}$	---	---	10	
$\text{I}_{\text{GSS}}$	Gate-Source Leakage Current	$\text{V}_{\text{GS}}=\pm 20\text{V}$ , $\text{V}_{\text{DS}}=0\text{V}$	---	---	$\pm 100$	nA
$\text{g}_{\text{fs}}$	Forward Transconductance	$\text{V}_{\text{DS}}=5\text{V}$ , $\text{I}_D=10\text{A}$	---	10	---	S
$\text{R}_{\text{g}}$	Gate Resistance	$\text{V}_{\text{DS}}=0\text{V}$ , $\text{V}_{\text{GS}}=0\text{V}$ , $f=1\text{MHz}$	---	2.1	---	$\Omega$
$\text{Q}_{\text{g}}$	Total Gate Charge	$\text{V}_{\text{DS}}=15\text{V}$ , $\text{V}_{\text{GS}}=4.5\text{V}$ , $\text{I}_D=20\text{A}$	---	9	---	nC
$\text{Q}_{\text{gs}}$	Gate-Source Charge		---	4.5	---	
$\text{Q}_{\text{gd}}$	Gate-Drain Charge		---	2.6	---	
$\text{T}_{\text{d(on)}}$	Turn-On Delay Time	$\text{V}_{\text{DD}}=15\text{V}$ , $\text{V}_{\text{GS}}=10\text{V}$ , $\text{R}_{\text{G}}=3.3\Omega$	---	8	---	ns
$\text{T}_{\text{r}}$	Rise Time		---	75	---	
$\text{T}_{\text{d(off)}}$	Turn-Off Delay Time		---	30	---	
$\text{T}_{\text{f}}$	Fall Time		---	25	---	
$\text{C}_{\text{iss}}$	Input Capacitance	$\text{V}_{\text{DS}}=25\text{V}$ , $\text{V}_{\text{GS}}=0\text{V}$ , $f=1\text{MHz}$	---	600	---	pF
$\text{C}_{\text{oss}}$	Output Capacitance		---	80	---	
$\text{C}_{\text{rss}}$	Reverse Transfer Capacitance		---	70	---	

## Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$\text{I}_{\text{s}}$	Continuous Source Current <sup>1</sup>	$\text{V}_{\text{G}}=\text{V}_{\text{D}}=0\text{V}$ , Force Current	---	---	36	A
$\text{I}_{\text{SM}}$	Pulsed Source Current <sup>2</sup>		---	---	144	A
$\text{V}_{\text{SD}}$	Diode Forward Voltage	$\text{V}_{\text{GS}}=0\text{V}$ , $\text{I}_{\text{s}}=8\text{A}$ , $T_J=25^\circ\text{C}$	---	---	1.2	V

Note :

1.Limited by wire bonding

2.Pulse width limited by safe operating area

3.The EAS data shows Max. rating . The test condition is  $\text{V}_{\text{DD}}=20\text{V}$ , $\text{V}_{\text{GS}}=10\text{V}$ , $\text{L}=0.5\text{mH}$ , $\text{I}_{\text{AS}}=12\text{A}$ 

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