

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
40V	2.6mΩ@10V	130A
	3.3mΩ@4.5V	

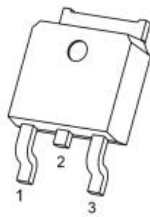
Feature

- Fast Switching
- Low Gate Charge and Rds on
- Low Reverse transfer capacitances
- 100% Single Pulse avalanche energy Test

Applications

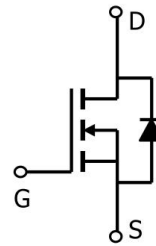
- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

Package

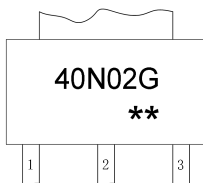


TO-252(1:G 2:D 3:S)

Circuit diagram



Marking



40N02G =Device Code
** =Week Code

Absolute maximum ratings (Ta=25°C unless otherwise noted)

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ¹	$I_D@TC=25^\circ C$	130	A
Continuous Drain Current ¹	$I_D@TC=100^\circ C$	92	A
Pulsed Drain Current ²	I_{DM}	520	A
Single Pulse Avalanche Energy ³	E_{AS}	306	mJ
Avalanche Current	I_{AS}	35	A
Total Power Dissipation ⁴	$P_D@TC=25^\circ C$	135	W
Thermal Resistance Junction-ambient (Steady State) ¹	$R_{\theta JA}$	45	$^\circ C/W$
Thermal Resistance Junction-Case ¹	$R_{\theta JC}$	0.93	$^\circ C/W$
Storage Temperature Range	T_{STG}	-55 to 150	$^\circ C$
Operating Junction Temperature Range	T_J	-55 to 150	$^\circ C$

Electrical characteristics (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	40	---	---	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=32V, V_{GS}=0V, T_J=25^\circ C$	---	---	1	uA
		$V_{DS}=32V, V_{GS}=0V, T_J=55^\circ C$	---	---	5	
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1	1.5	2	V
Static Drain-Source On-Resistance ²	$R_{DS(on)}$	$V_{GS}=10V, I_D=30A$	---	2.6	3.3	m Ω
		$V_{GS}=4.5V, I_D=20A$	---	3.3	4.5	
Dynamic characteristics						
Total Gate Charge (4.5V)	Q_g	$V_{DS}=20V, V_{GS}=10V, I_D=55A$	---	62	---	nC
Gate-Source Charge	Q_{gs}		---	9.7	---	
Gate-Drain Charge	Q_{gd}		---	9.2	---	
Input Capacitance	C_{iss}	$V_{DS}=20V, V_{GS}=0V, f=1MHz$	---	3515	---	pF
Output Capacitance	C_{oss}		---	854	---	
Reverse Transfer Capacitance	C_{rss}		---	62	---	
Switching Characteristics						
Turn-On Delay Time	$T_{d(on)}$	$V_{DD}=20V, V_{GS}=10V, R_G=6\Omega, I_D=55A$	---	10	---	ns
Rise Time	T_r		---	4.8	---	
Turn-Off Delay Time	$T_{d(off)}$		---	32	---	
Fall Time	T_f		---	5.1	---	
Diode Characteristics						
Diode Forward Voltage ²	V_{SD}	$V_{GS}=0V, I_S=1A, T_J=25^\circ C$	---	---	1.2	V

Note :

- The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- The EAS data shows Max. rating. The test condition is $V_{DD}=20V, V_{GS}=10V, L=0.5mH, R_G=25\Omega$
- The power dissipation is limited by 150 $^\circ C$ junction temperature
- The data is theoretically the same as I_D and I_{DM} , in real applications, should be limited by total power dissipation.

Typical Characteristics

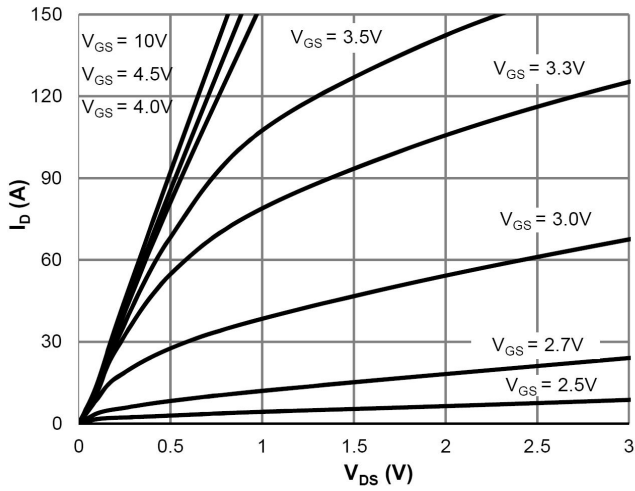


Figure 1: Saturation Characteristics

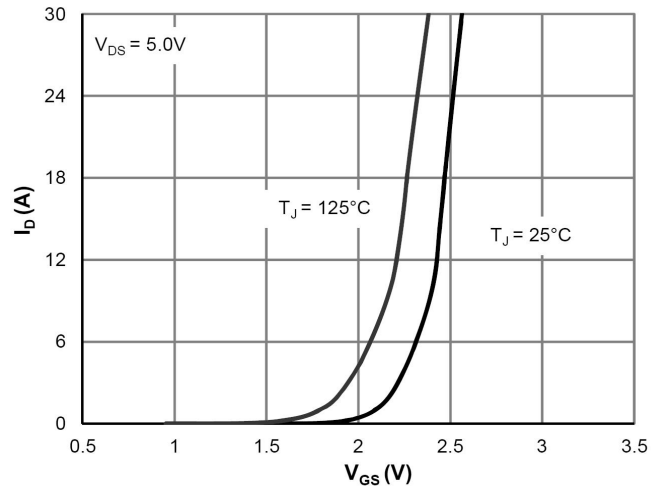


Figure 2: Transfer Characteristics

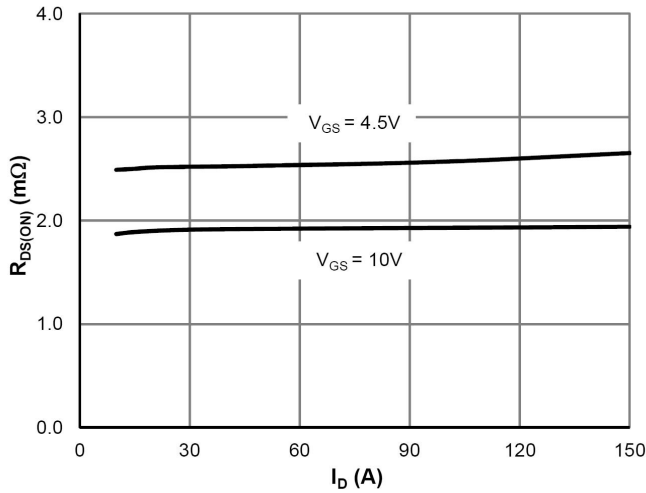


Figure 3: $R_{DS(ON)}$ vs. Drain Current

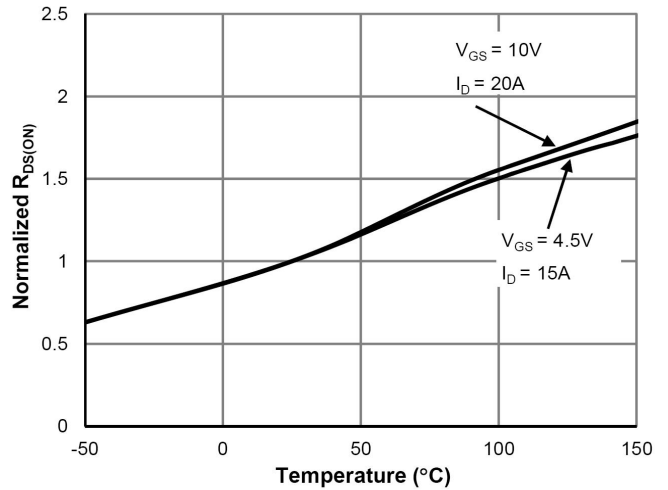


Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

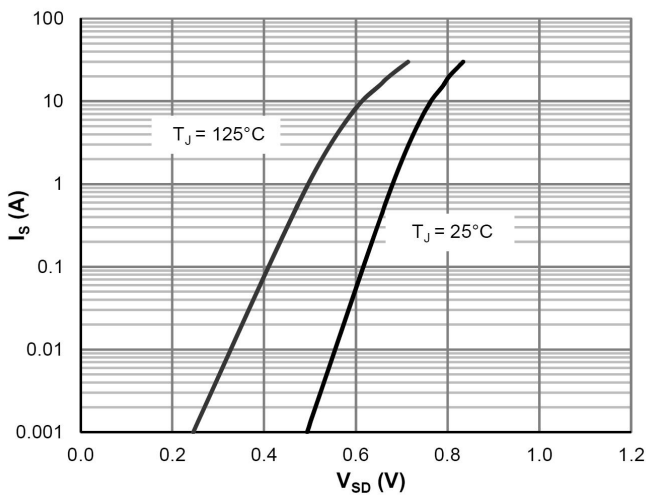


Figure 5: Body-Diode Characteristics

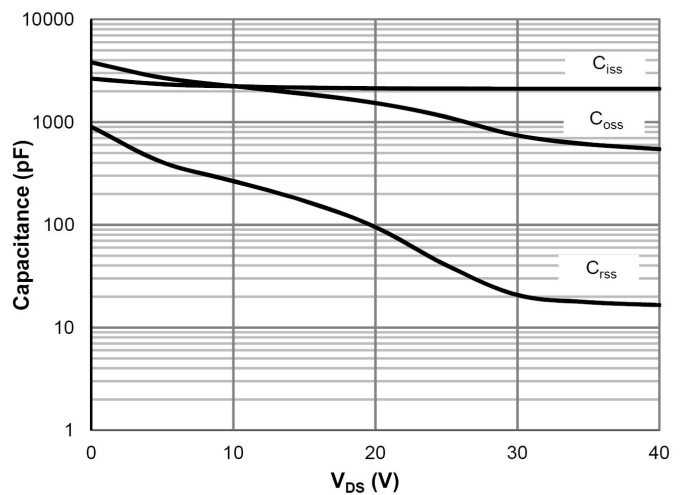


Figure 6: Capacitance Characteristics

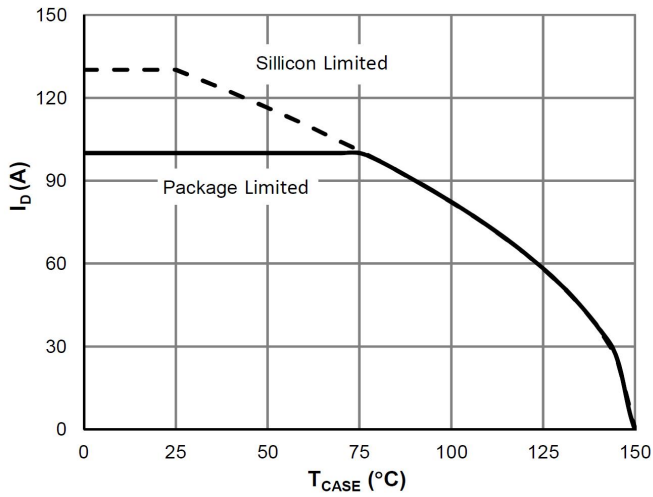


Figure 7: Current De-rating

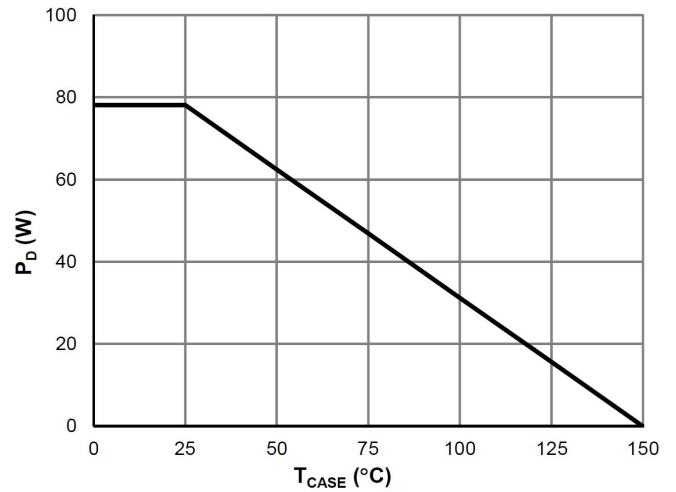


Figure 8: Power De-rating

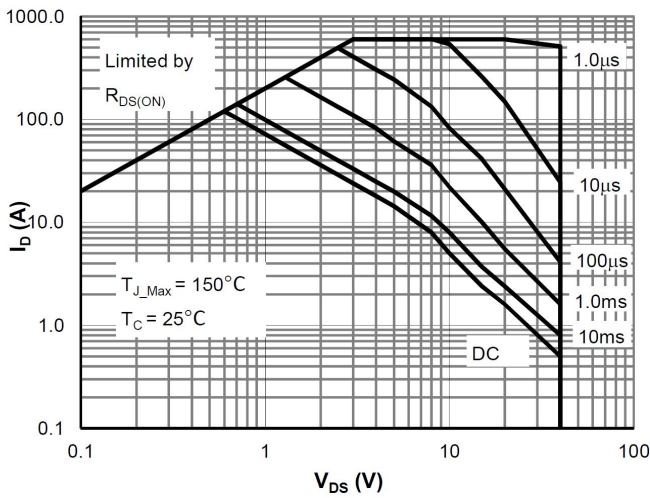


Figure 9: Maximum Safe Operating Area

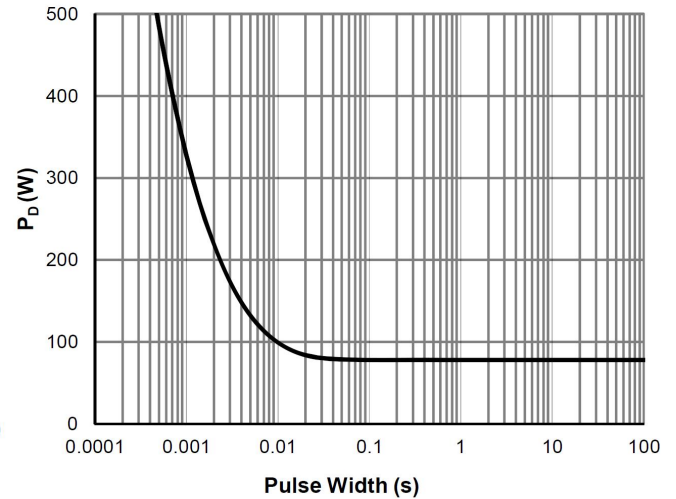


Figure 10: Single Pulse Power Rating, Junction-to-Case

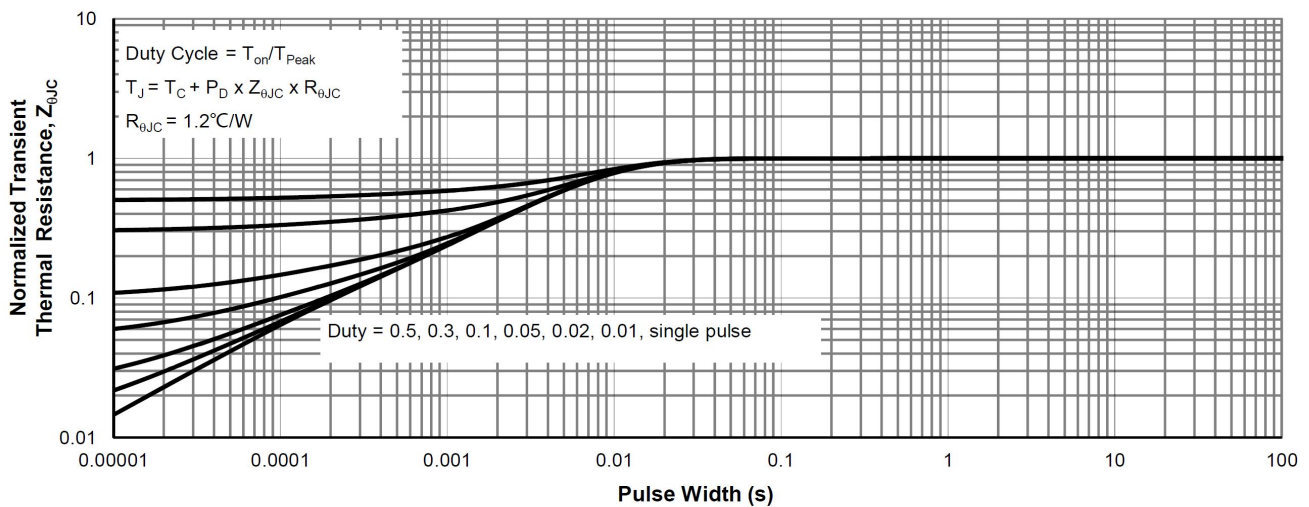
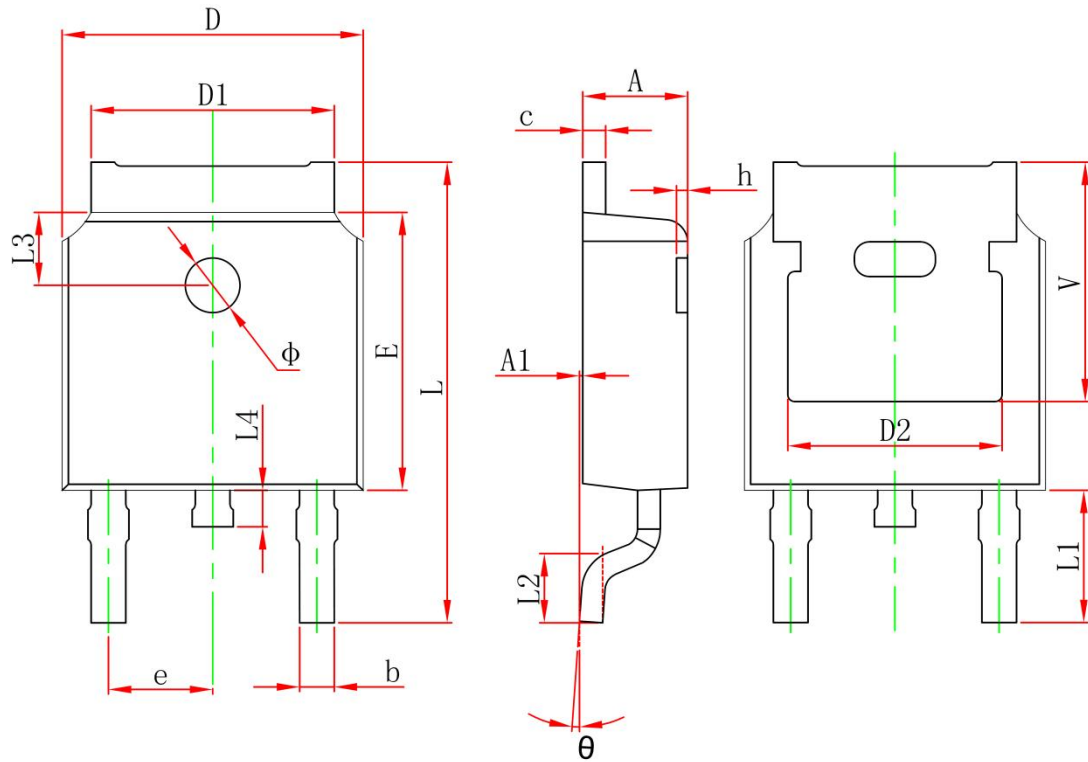


Figure 11: Normalized Maximum Transient Thermal Impedance



TO-252 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
ϕ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 REF.		0.211 REF.	

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