

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
40V	2.3m Ω @10V	130A
	3m Ω @4.5V	

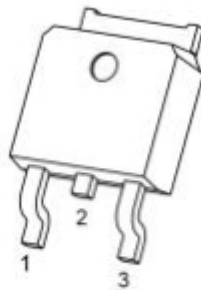
Feature

- $V_{DS} = 40V, I_D = 130A$
- High density cell design for ultra low R_{dson}
- Good stability and uniformity with high E_{AS}
- 100% Single Pulse avalanche energy Test

Application

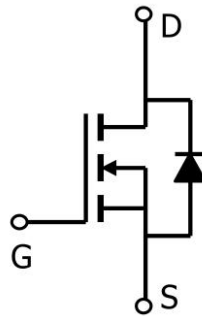
- Power switching application
- Hard switched and high frequency circuits
- DC-DC Converters

Package



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

Circuit diagram



Marking



40N02 : Product code
** : Week code.

Absolute maximum ratings

($T_a=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	130	A
Pulsed Drain Current	I_{DM}	520	A
Avalanche Current	I_{AS}	35	
Maximum Power Dissipation	P_D	130	W
Single pulse avalanche energy ⁽¹⁾	E_{AS}	306	mJ
Thermal Resistance,Junction-to-Case ⁽²⁾	$R_{\theta JC}$	0.96	$^{\circ}\text{C/W}$
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^{\circ}\text{C}$

Electrical characteristics

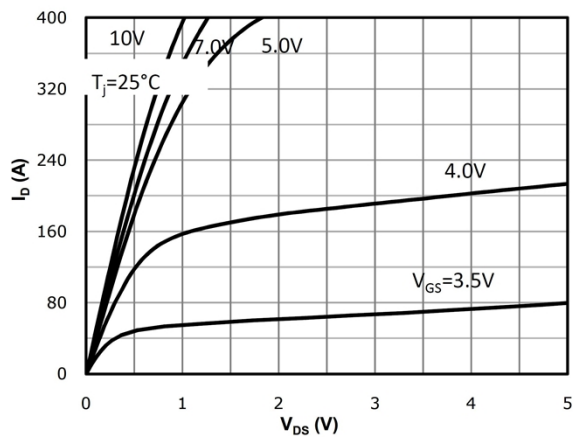
($T_A=25^{\circ}\text{C}$, unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	BV (BR)DSS	V _{GS} = 0V, I _D =250μA	40			V
Zero gate voltage drain current	I _{DSS}	V _{DS} =32V,V _{GS} = 0V			1	uA
Gate-body leakage current	I _{GSS}	V _{GS} =±20V , V _{DS} =0V			±100	uA
Gate-source threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.0	1.5	2.5	V
Drain-source on-resistance ²	R _{DS(on)}	V _{GS} =10V, I _D =30A		2.3	2.9	mΩ
		V _{GS} =4.5V, I _D =20A		3	4	
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =20V, V _{GS} =0V, f=1MHz		5728		pF
Output Capacitance	C _{oss}			690		
Reverse Transfer Capacitance	C _{rss}			328		
Total Gate Charge	Q _g	V _{DS} =20V, V _{GS} =10V, I _D =50A		125		pF
Gate-Source Charge	Q _{gs}			23		
Gate-Drain Charge	Q _{gd}			37		
Switching Characteristics						
Turn-On Delay Time	T _{d(on)}	V _{DD} =20V, I _D =50A, R _L =1Ω, V _{GS} =10V, R _G =10Ω		15		nS
Rise Time	T _r			42		
Turn-Off Delay Time	T _{d(off)}			35		
Fall Time	T _f			13		
Diode Characteristics						
Diode Forward Voltage ²	V _{SD}	V _{GS} =0V, I _S =1A			1.2	V

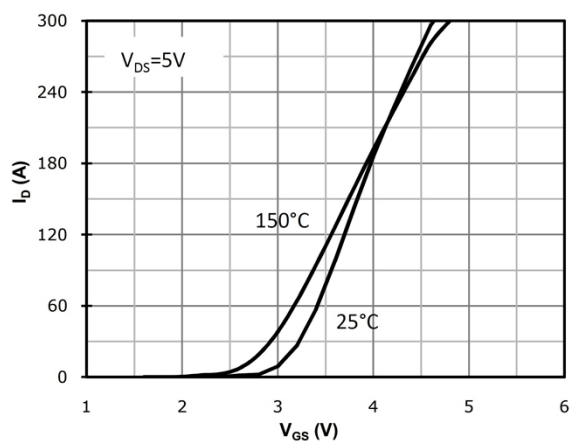
Note:

1. E_{AS} condition : $T_J = 25^{\circ}\text{C}, V_{DD} = 20V, V_G = 10V, L = 0.5mH, R_g = 25\Omega$
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

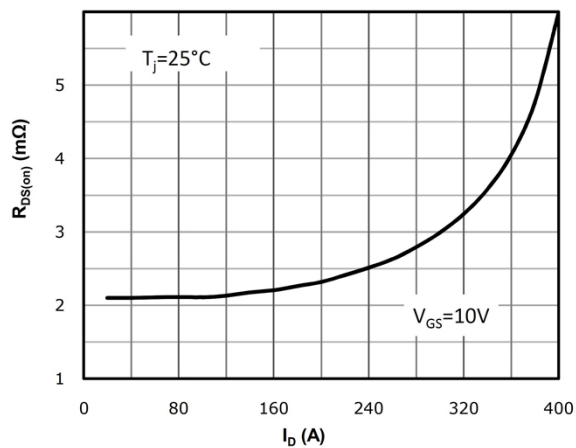
Typical Characteristics



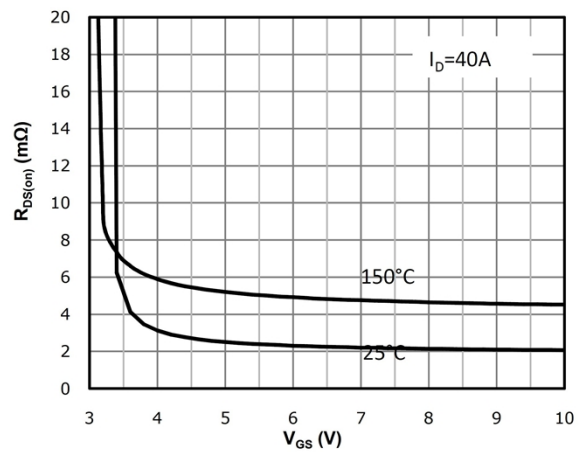
Output Characteristics



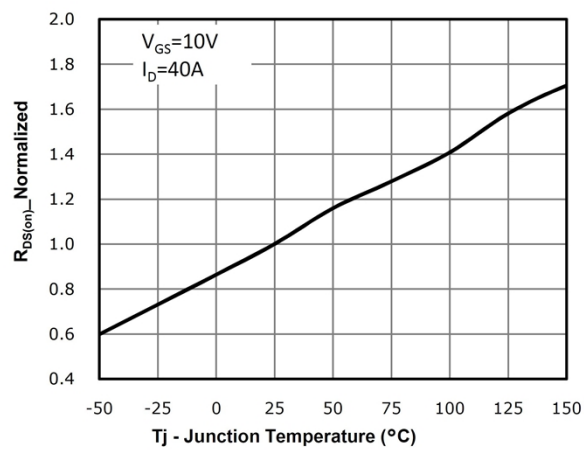
Transfer Characteristics



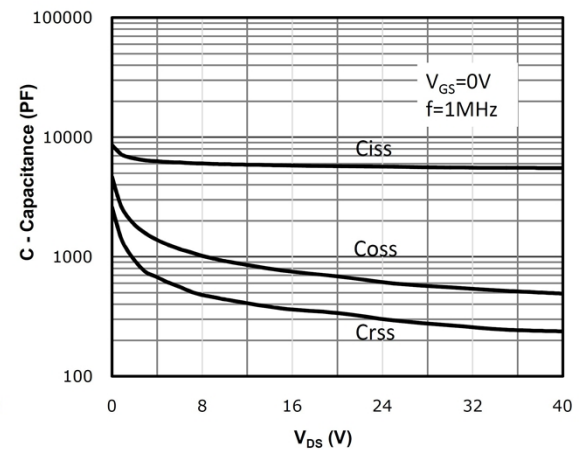
Rds(on) vs Drain Current and Gate Voltage



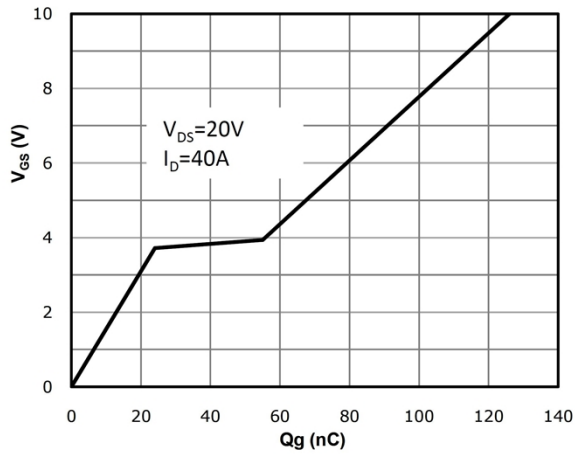
Rds(on) vs Gate Voltage



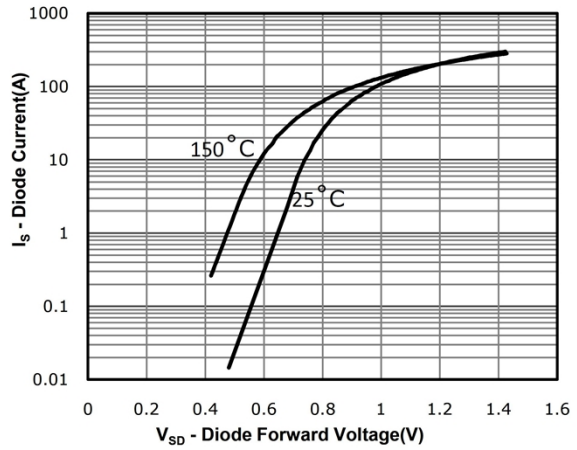
Rds(on) vs. Temperature



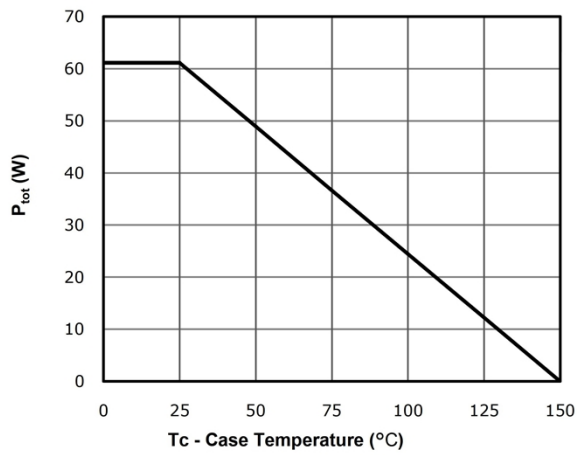
Capacitance Characteristics



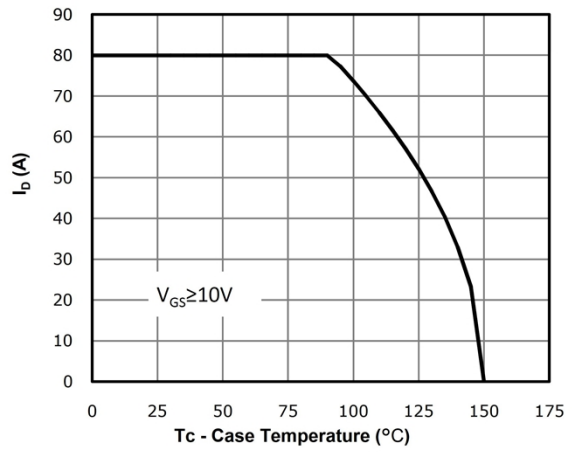
Gate Charge Characteristics



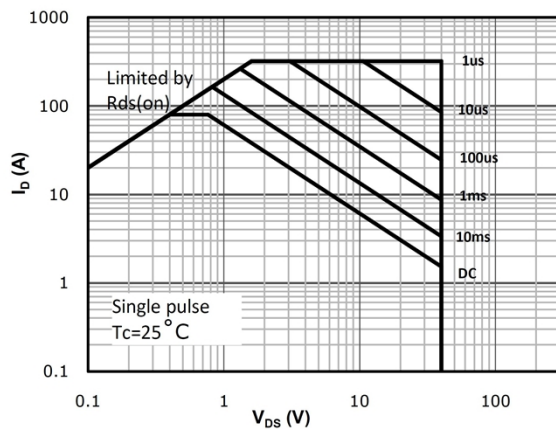
Body-diode Forward Characteristics



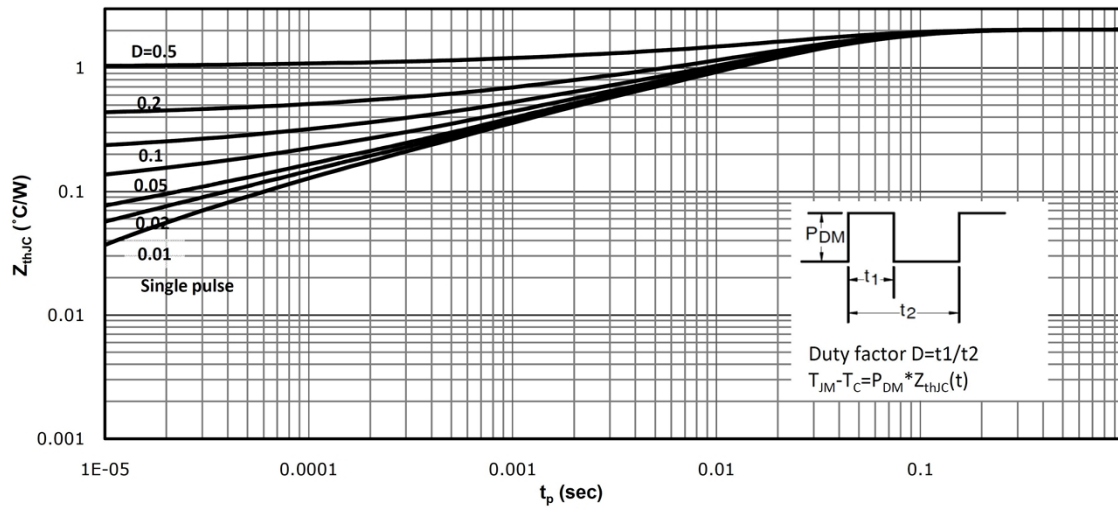
Power Dissipation



Drain Current Derating

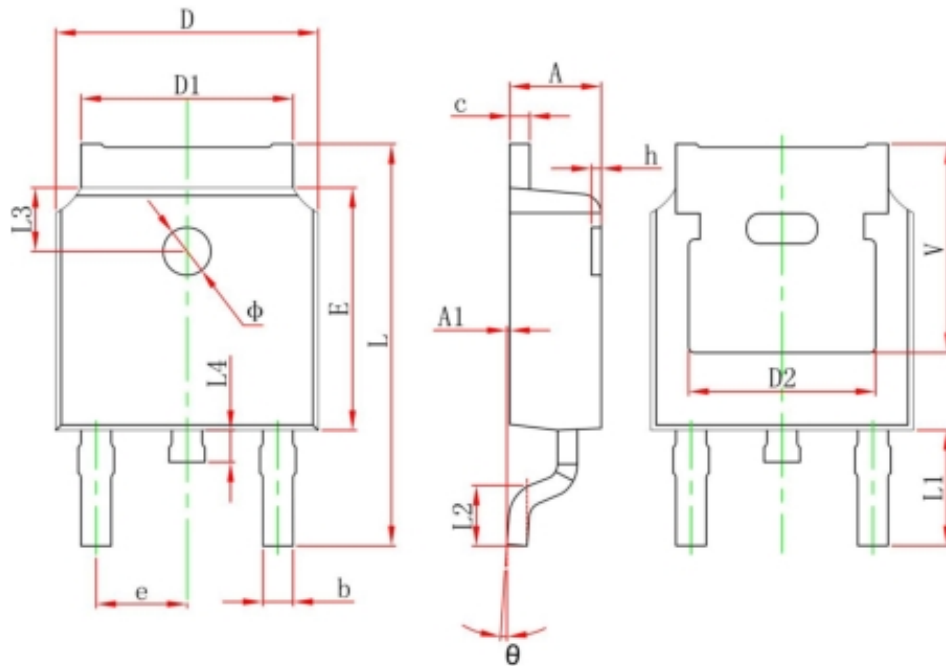


Safe Operating Area



Max. 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.	