

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
200V	54mΩ@10V	40A

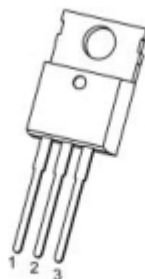
Feature

- Fast Switching
- Low Gate Charge and Rdson
- 100% Single Pulse avalanche energy Test

Application

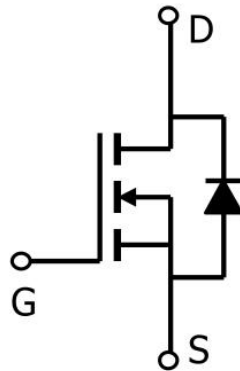
- Power switching application
- DC-DC Converter
- Power Management

Package

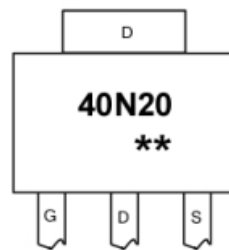


TO-220-3L-C(1:G 2:D 3:S)

Circuit diagram



Marking



40N20
**

: 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}	200	V
Gate source voltage	V_{GS}	± 20	V
Continuous drain current($T_c=25^\circ\text{C}$)	I_D	40	A
Pulsed drain current	I_{DM}	160	A
Power dissipation($T_c=25^\circ\text{C}$)	P_D	43	W
Single pulsed avalanche energy ¹⁾	E_{AS}	1066	A
Thermal resistance, junction-case	$R_{\theta JC}$	2.90	$^\circ\text{C}/\text{W}$
Operation and storage temperature	T_{STG}, T_J	-55 to 150	$^\circ\text{C}$

Electrical characteristics

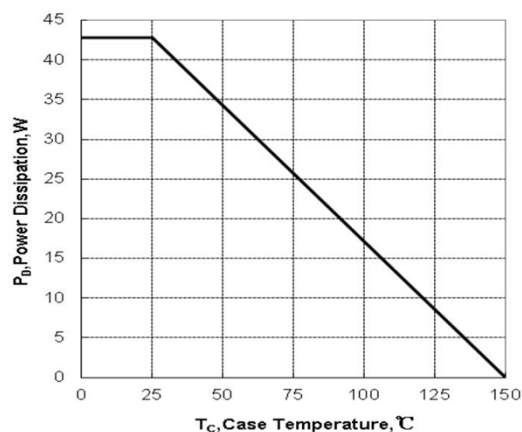
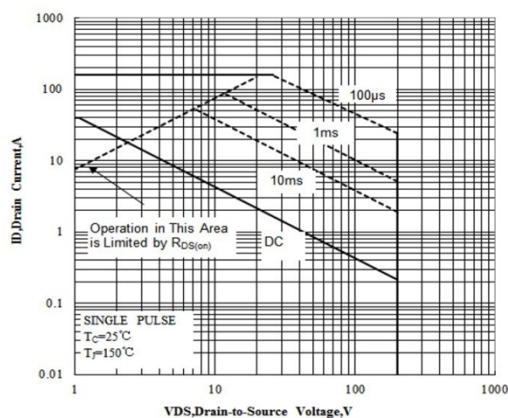
($T_A=25^{\circ}\text{C}$, unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV (BR)DSS	V _{GS} = 0V, I _D =250μA	200			V
Drain Cut-Off Current	I _{DSS}	V _{DS} =160V,V _{GS} = 0V			1	uA
Gate Leakage Current	I _{GSS}	V _{GS} =±20V , V _{DS} =0V			±0.1	uA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	2	3	4	V
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} =10V, I _D =20A		54	65	mΩ
Dynamic Characteristics						
Input Capacitance	C _{iSS}	V _{DS} =25V, V _{GS} =0V, f=1MHz		2580		pF
Output Capacitance	C _{oSS}			383		
Reverse Transfer Capacitance	C _{rSS}			25		
Switching Characteristics						
Total Gate Charge	Q _g	V _{DS} =200V, V _{GS} =10V, I _D =45A		45		pF
Gate-Source Charge	Q _{gs}			17		
Gate-Drain Charge	Q _{gd}			16		
Turn-On Delay Time	T _{d(on)}	V _{GS} =10V, V _{DS} =125V, I _D =45A, R _G =10Ω		33		nS
Rise Time	T _r			151		
Turn-Off Delay Time	T _{d(off)}			61		
Fall Time	T _f			89		
Diode Characteristics						
Source-Drain Diode Forward Voltage	V _{SD}	V _{GS} =0V , I _S =1A			1.2	V

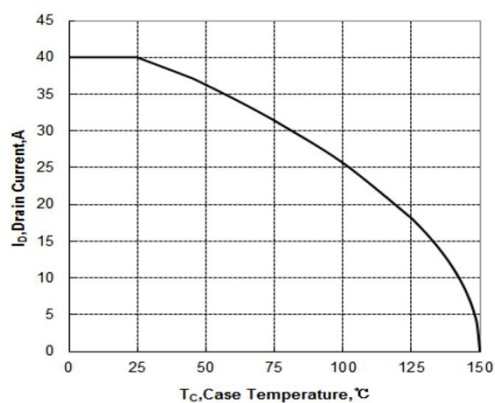
Note:

1. E_{AS} is tested at starting $T_j = 25^{\circ}\text{C}$, $V_{DD} = 75V, V_{GS} = 10V, L = 0.5mH, R_g = 25m\Omega$;

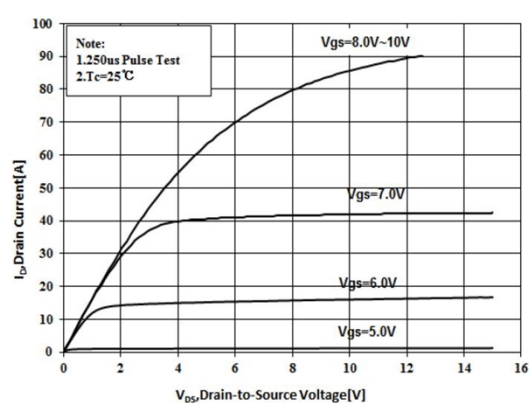
Typical Characteristics



Maximum Forward Bias Safe Operating Area

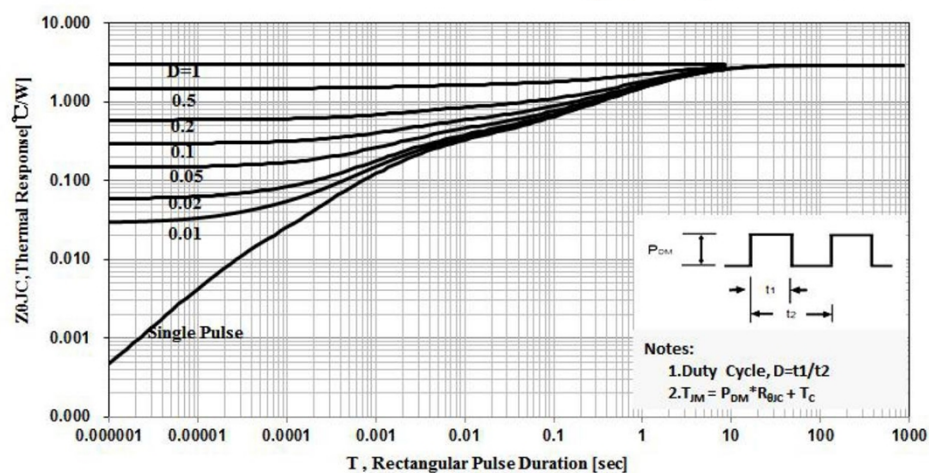


Maximum Power dissipation vs Case Temperature

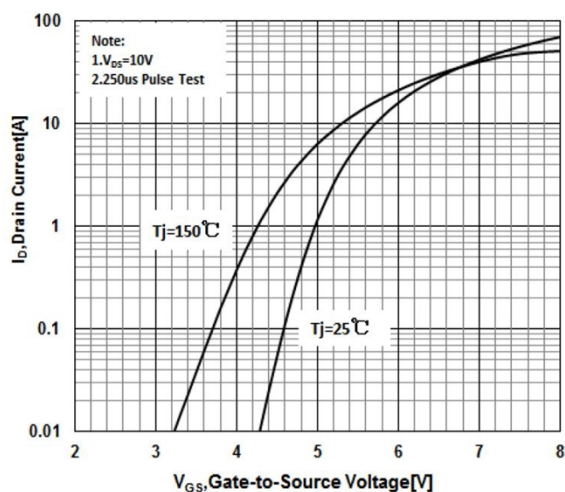


Maximum Continuous Drain Current vs Case Temperature

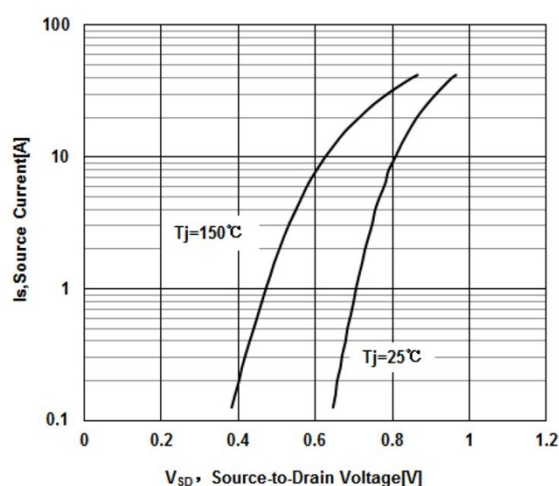
Typical Output Characteristics



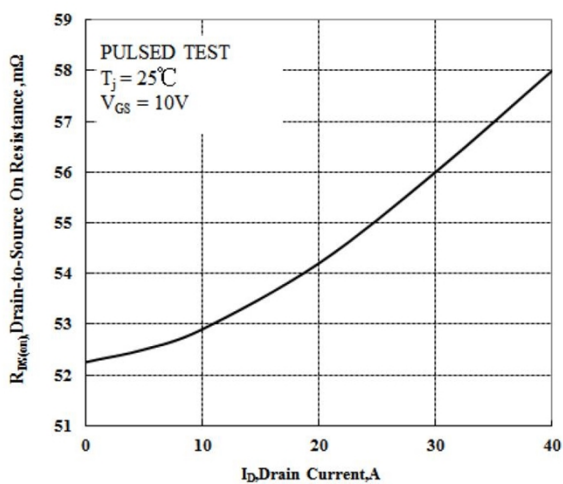
Maximum Effective Thermal Impedance, Junction to Case



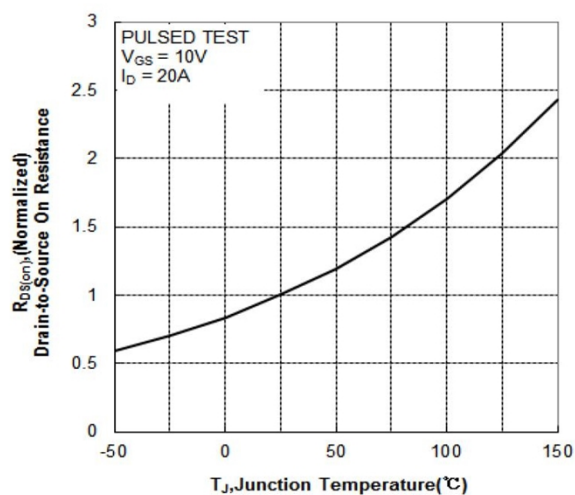
Typical Transfer Characteristics



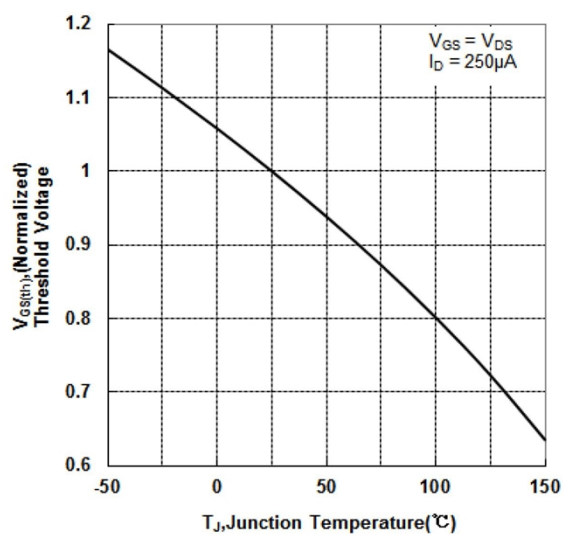
Typical Body Diode Transfer Characteristics



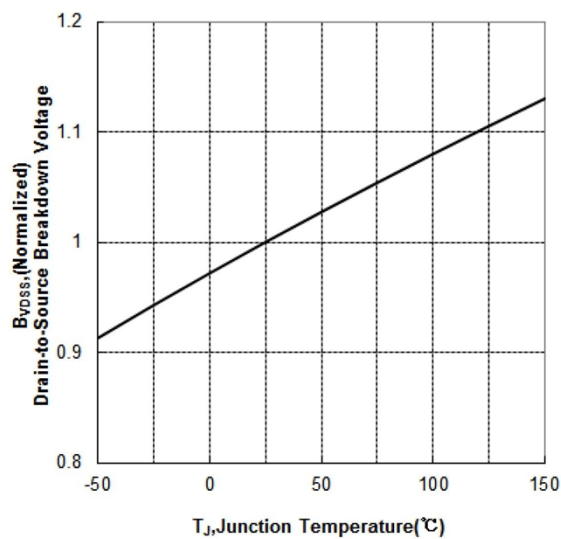
Typical Drain to Source ON Resistance
vs Drain Current



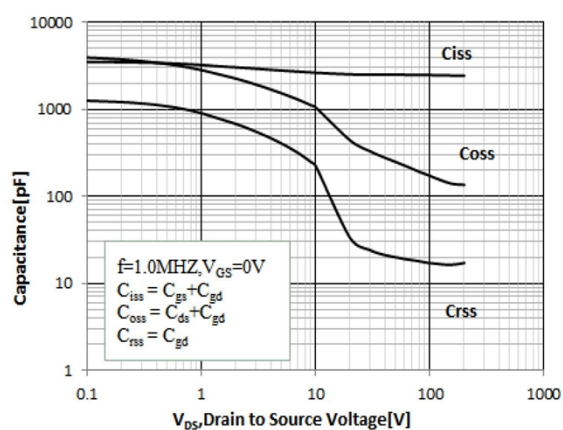
Typical Drain to Source on Resistance
vs Junction Temperature



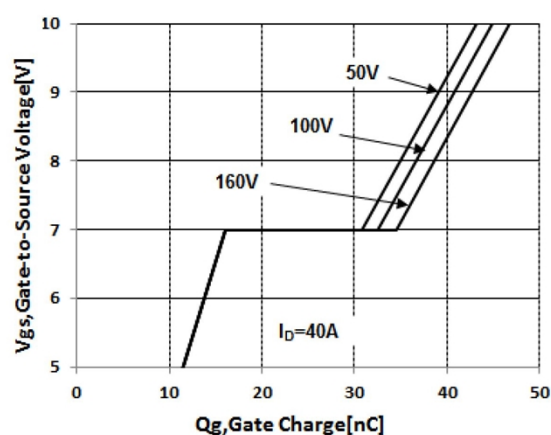
Typical Theshold Voltage vs
Junction Temperature



Typical Breakdown Voltage vs
Junction Temperature

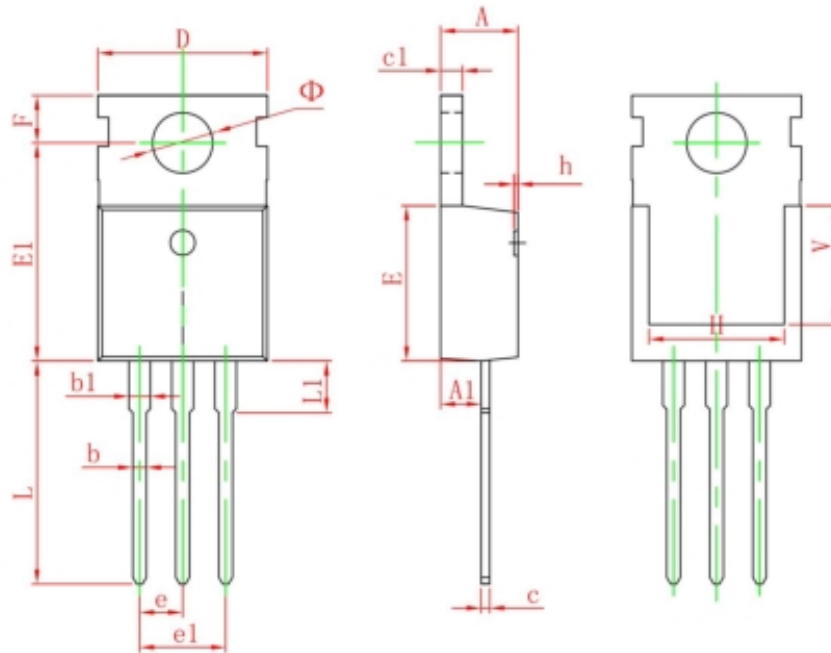


Typical Capacitance vs Drain to Source Voltage



Typical Gate Charge vs Gate to Source Voltage

TO-220-3L-C Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.950	9.750	0.352	0.384
E1	12.650	13.050	0.498	0.514
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	6.900 REF.		0.276 REF.	
Φ	3.400	3.800	0.134	0.150