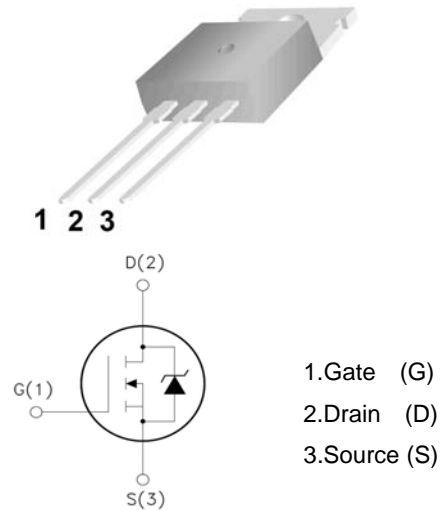


140N04

Features:

- Low Intrinsic Capacitances.
- Excellent Switching Characteristics.
- Extended Safe Operating Area.
- Unrivalled Gate Charge : $Q_g=78\text{nC}$ (Typ.).
- $BVDSS=40\text{V}, I_D=140\text{A}$
- $R_{DS(on)} : 4\text{m}\Omega$ (Max) @ $V_G=10\text{V}$
- 100% Avalanche Tested

TO-220



- 1.Gate (G)
- 2.Drain (D)
- 3.Source (S)

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

Symbol	Parameter	Maximum	Unit	
V_{DSS}	Drain-to-Source Voltage	40	V	
V_{GSS}	Gate-to-Source Voltage	± 20	V	
I_D	Continuous Drain Current	$T_C=25^\circ\text{C}$	140	A
		$T_C=100^\circ\text{C}$	110	A
I_{DP}	Pulsed Drain Current	$T_C=25^\circ\text{C}$	400	A
EAS	Avalanche energy	$L=0.125\text{mH}$	400	mJ
PD	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	150	
		$T_C=100^\circ\text{C}$	75	
T_J, T_{STG}	Junction & Storage Temperature Range	-55~175	$^\circ\text{C}$	

Package limitation current is 70A

Thermal Characteristics

Symbol	Parameter	Typical	Unit
$R_{\theta jc}$	Thermal Resistance-Junction to Case	0.85	$^\circ\text{C}/\text{W}$
$R_{\theta ja}$	Thermal Resistance-Junction to Ambient	62.5	

Electrical Characteristics (TA=25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ	Max.	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	40	—	—	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =32V, V _{GS} =0V	—	—	1	uA
		T _J =125°C	—	—	30	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250uA	1	2	3	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V	—	—	±100	nA
R _{DS(on)} ¹	Drain-Source On-Resistance	V _{GS} =10V, I _D =50A	—	3	4	mΩ
			—			
Diode Characteristics						
V _{SD} ¹	Diode Forward Voltage	I _{SD} =50A, V _{GS} =0V	—	0.85	1.2	V
I _S	Diode Continuous Forward Current		—	50		A
t _{rr}	Reverse Recovery Time	I _F =50A,	—	55		ns
Q _{rr}	Reverse Recovery Charge	di/dt=100A/us	—	95		NC
Dynamic Characteristics²						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, Frequency=1MHz	—	2	—	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =20V Frequency=1MHz	—	4500		PF
C _{oss}	Output Capacitance		—	810		
C _{rss}	Reverse Transfer Capacitance		—	246		
t _{d(on)}	Turn-On Delay Time	V _{DD} =20V, R _L =30Ω I _D =50A, V _{GS} =10V R _G =4.7Ω	—	19		ns
t _r	Turn-On Rise Time		—	15		
t _{d(off)}	Turn-Off Delay Time		—	60		
t _f	Turn-Off Fall Time		—	34		
Gate Charge Characteristics²						
Q _g	Total Gate Charge	V _{DS} =20V, V _{GS} =10V I _D =50A	—	78		NC
Q _{gs}	Gate-to-Source Charge		—	15		
Q _{gd}	Gate-to-Drain Charge		—	26		

Note: 1: Pulse test; pulse width ≤ 300ns, duty cycle ≤ 2%.

2: Guaranteed by design, not subject to production testing.

Typical Characteristics

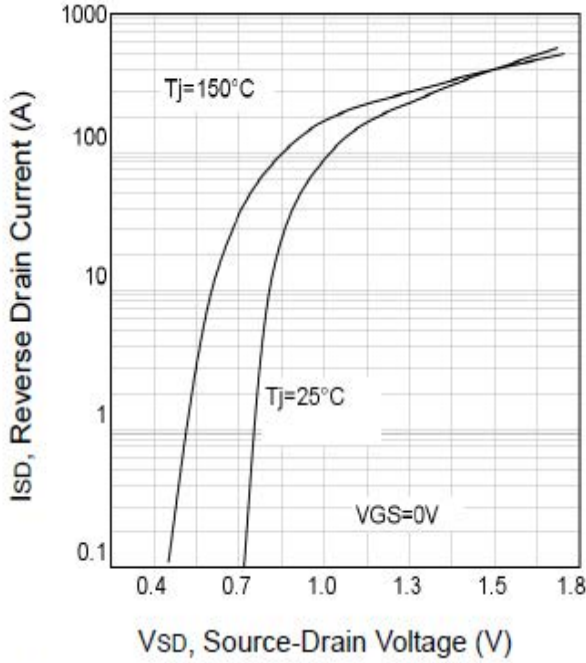


Fig7. Typical Source-Drain Diode Forward Voltage

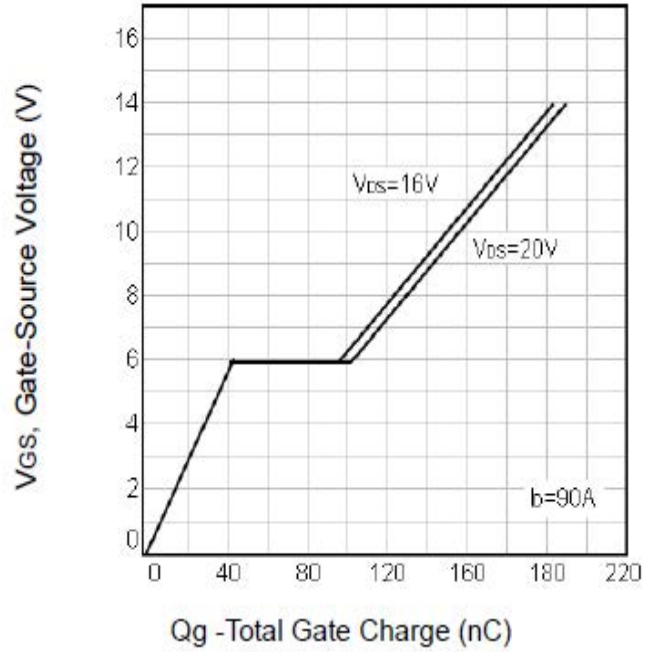


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

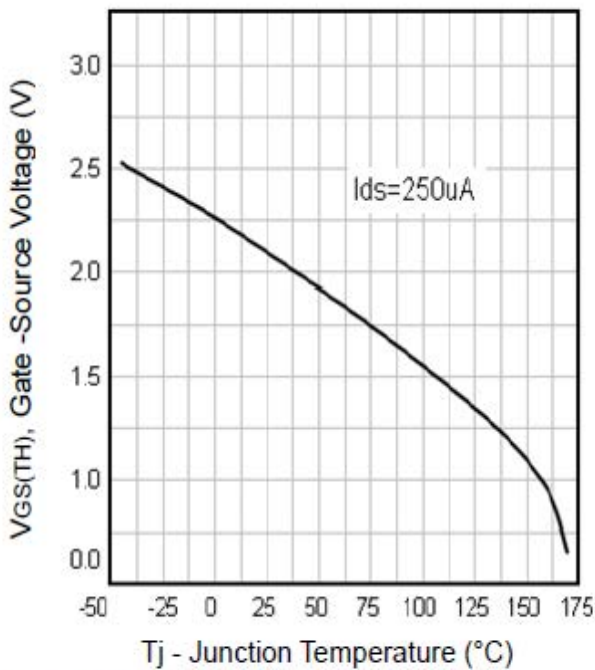


Fig9. Threshold Voltage Vs. Temperature

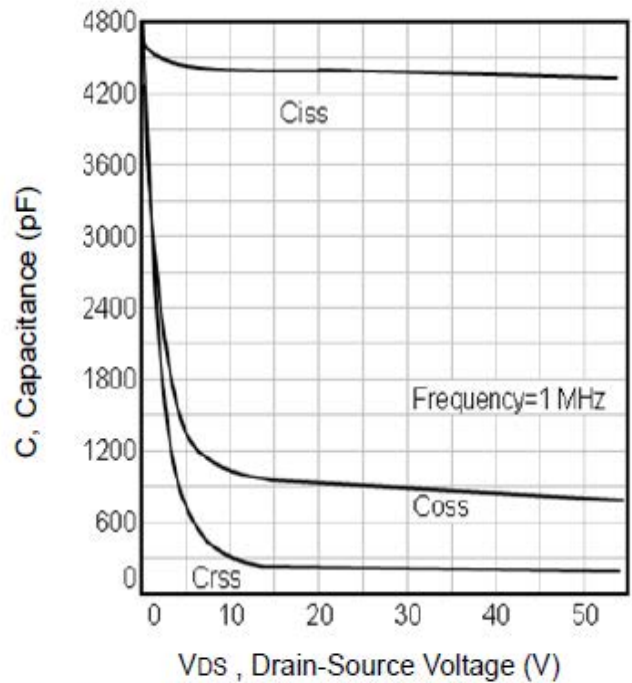


Fig10. Typical Capacitance Vs. Drain-Source Voltage

Typical Characteristics

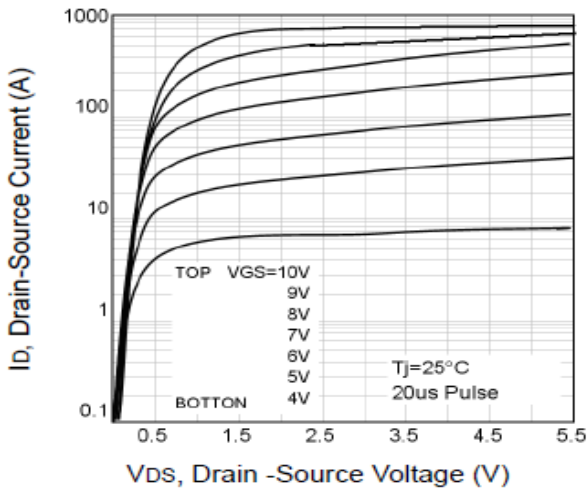


Fig1. Typical Output Characteristics

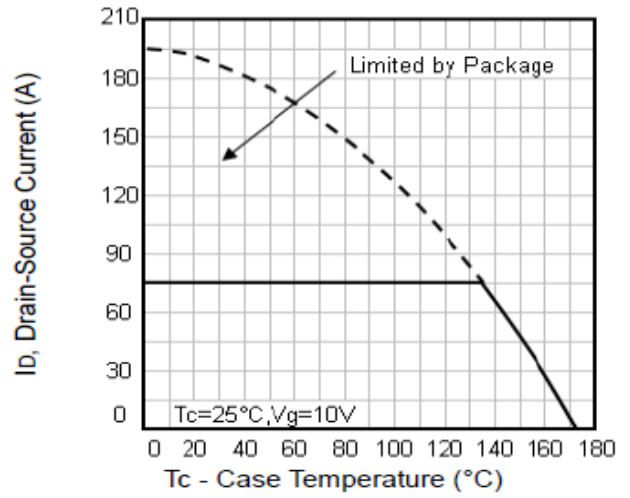


Fig2. Maximum Drain Current Vs. Case Temperature

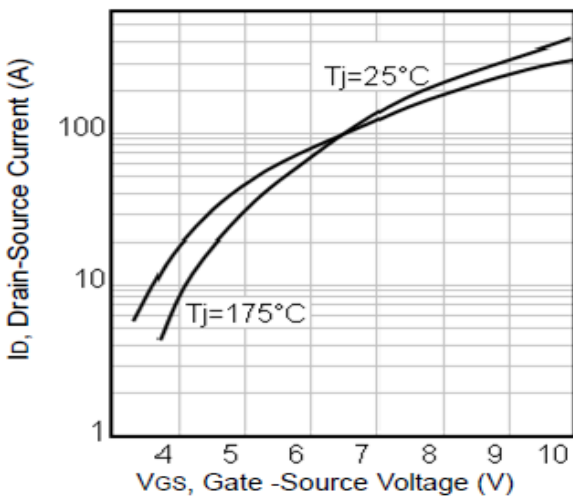


Fig3. Typical Transfer Characteristics

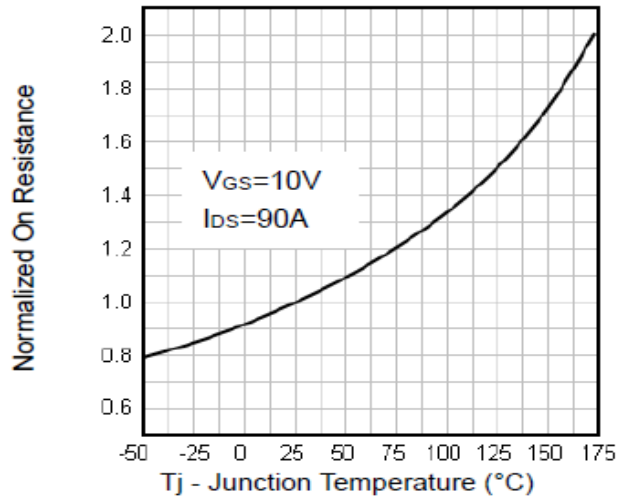
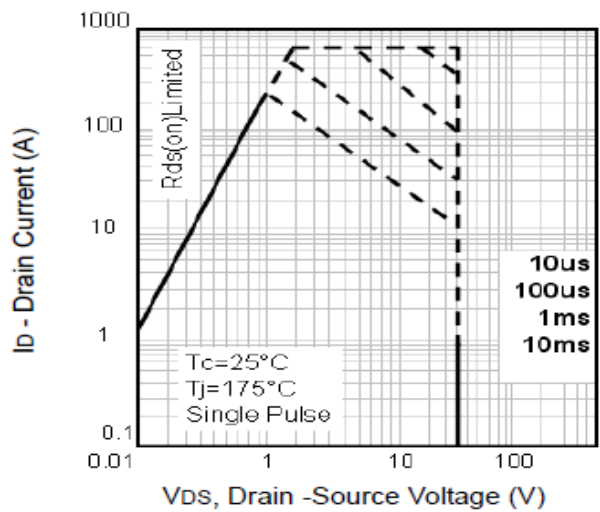
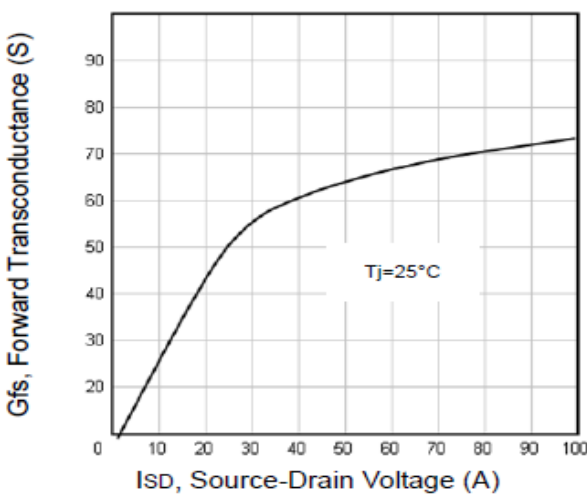
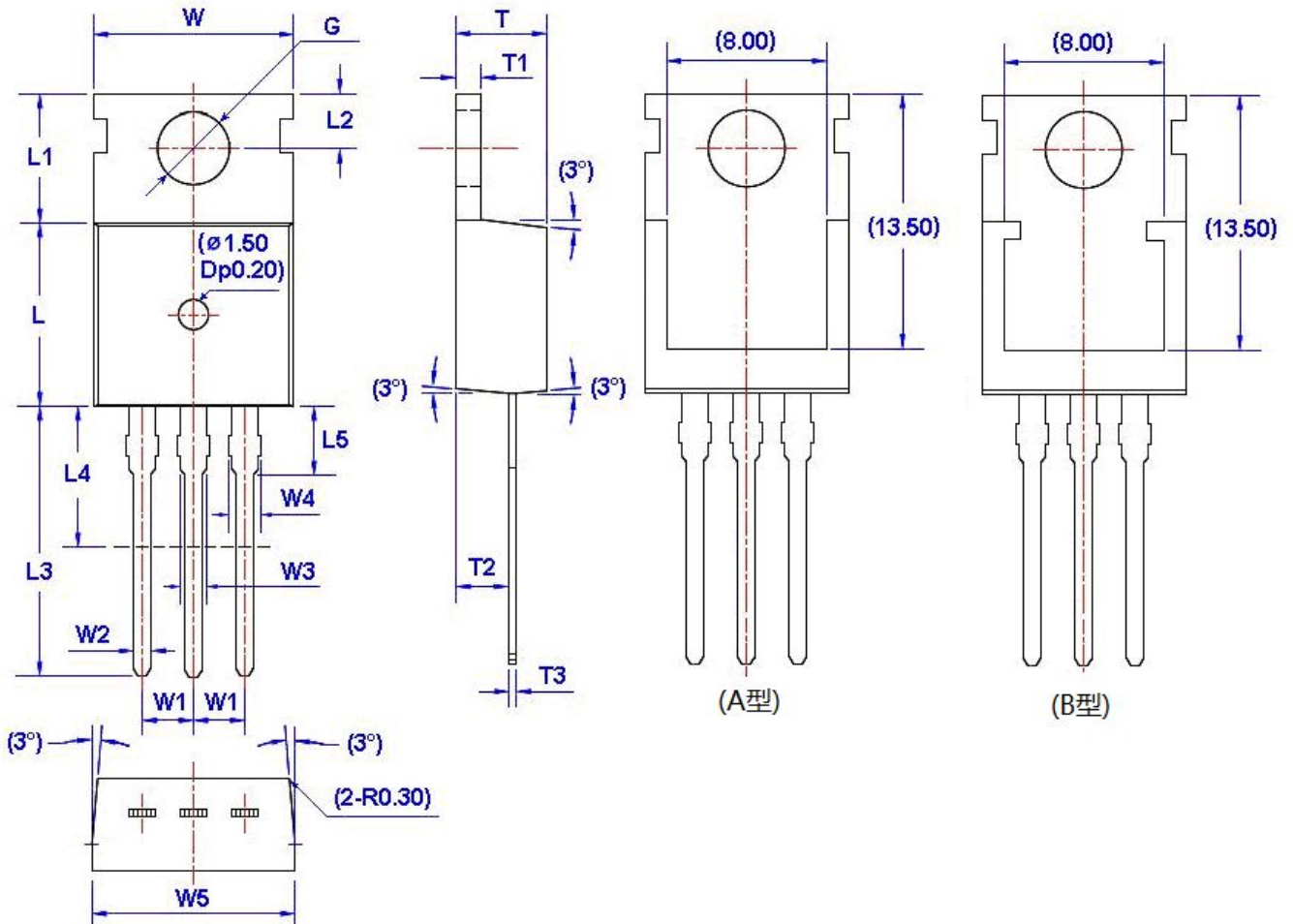


Fig4. Normalized On-Resistance Vs. Temperature



Package Dimension
TO-220

Unit: mm



Symbol	Size		Symbol	Size		Symbol	Size		Symbol	Size	
	Min	Max		Min	Max		Min	Max		Min	Max
W	9.66	10.28	W5	9.80	10.20	L4**	6.20	6.60	T3	0.45	0.60
W1	2.54 (TYP)		L	9.00	9.40	L5	2.79	3.30	G(Φ)	3.50	3.70
W2	0.70	0.95	L1	6.40	6.80	T	4.30	4.70			
W3	1.17	1.37	L2	2.70	2.90	T1	1.15	1.40			
W4*	1.32	1.72	L3	12.70	14.27	T2	2.20	2.60			