

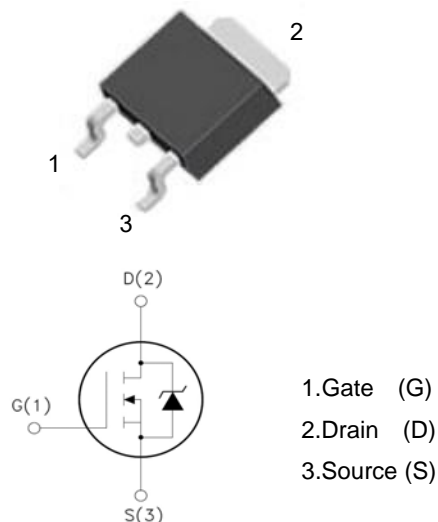
## XXW90N03

30V N-Channel MOSFET

### Features:

- Low Intrinsic Capacitances.
- Excellent Switching Characteristics.
- Extended Safe Operating Area.
- Unrivalled Gate Charge : $Q_g = 40\text{ nC}$  (Typ.).
- $BVDSS = 30\text{ V}, I_D = 90\text{ A}$
- $R_{DS(on)} : 4.5\text{ m}\Omega$  (Max) @  $V_G = 10\text{ V}$
- 100% Avalanche Tested

TO-252



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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	90	A
Drain Current-Continuous( $T_C = 100^\circ\text{C}$ )	$I_D(100^\circ\text{C})$	59	A
Pulsed Drain Current	$I_{DM}$	360	A
Maximum Power Dissipation	$P_D$	68	W
Single pulse avalanche energy <sup>(Note 5)</sup>	$E_{AS}$	95	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 175	$^\circ\text{C}$

## Thermal Characteristics

Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup>	$R_{\theta JC}$	2.2	$^\circ\text{C/W}$
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**Electrical Characteristics** (TA=25°C unless otherwise noted)

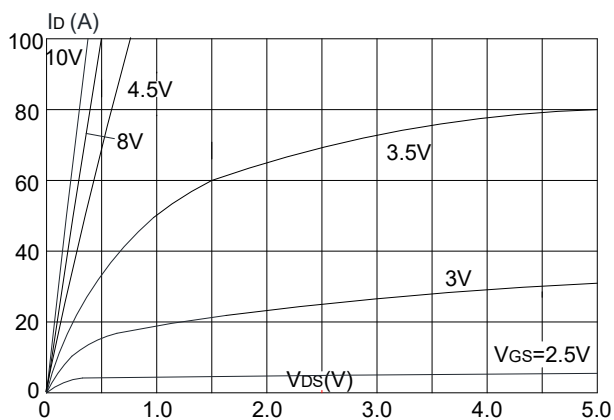
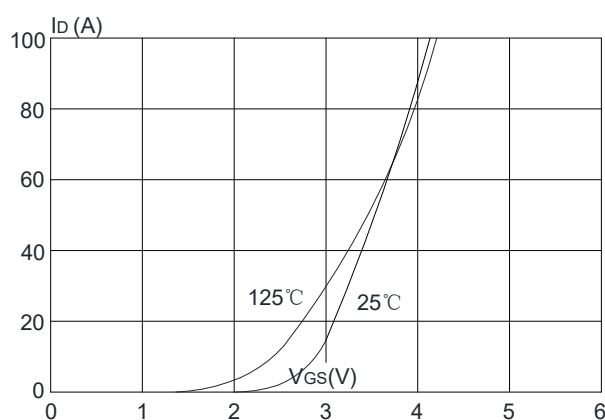
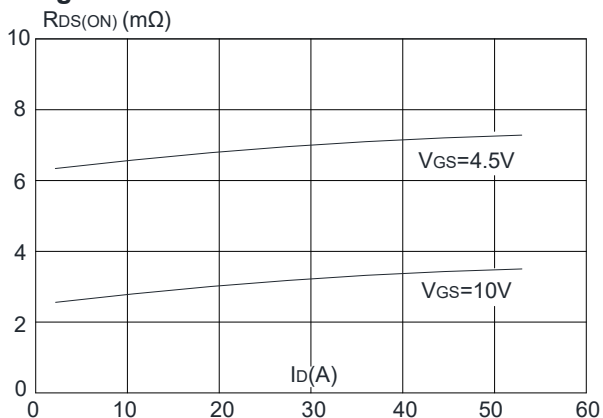
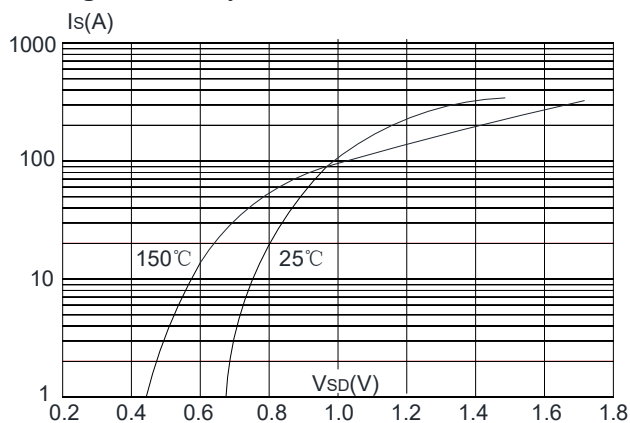
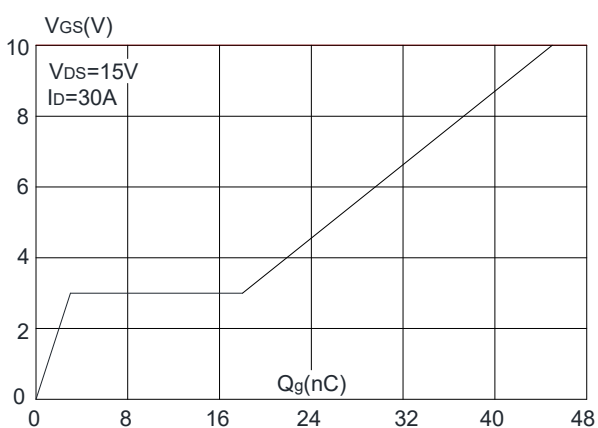
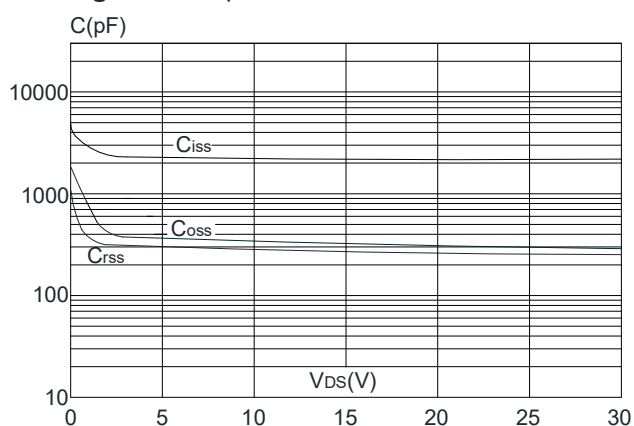
Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=30V, V_{GS}=0V,$	-	-	1.0	$\mu A$
$I_{GSS}$	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.5	2.5	V
$R_{DS(on)}$	Static Drain-Source on-Resistance <small>note3</small>	$V_{GS}=10V, I_D=30A$	-	3.3	4.5	m $\Omega$
		$V_{GS}=4.5V, I_D=20A$	-	6.7	9.5	
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=15V, V_{GS}=0V,$ $f=1.0MHz$	-	2100	-	pF
$C_{oss}$	Output Capacitance		-	326	-	pF
$C_{rss}$	Reverse Transfer Capacitance		-	282	-	pF
$Q_g$	Total Gate Charge	$V_{DS}=15V, I_D=30A,$ $V_{GS}=10V$	-	45	-	nC
$Q_{gs}$	Gate-Source Charge		-	3	-	nC
$Q_{gd}$	Gate-Drain("Miller") Charge		-	15	-	nC
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-on Delay Time	$V_{DS}=15V,$ $I_D=30A, R_{GEN}=3\Omega,$ $V_{GS}=10V$	-	21	-	ns
$t_r$	Turn-on Rise Time		-	32	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	59	-	ns
$t_f$	Turn-off Fall Time		-	34	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum Continuous Drain to Source Diode Forward Current		-	-	90	A
$I_{SM}$	Maximum Pulsed Drain to Source Diode Forward Current		-	-	360	A
$V_{SD}$	Drain to Source Diode Forward Voltage	$V_{GS}=0V, I_S=30A$	-	-	1.2	V
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=20A, di/dt=100A/\mu s$	-	15	-	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge		-	4	-	nC

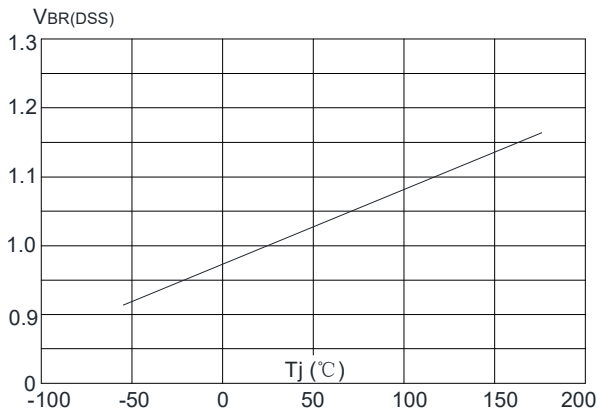
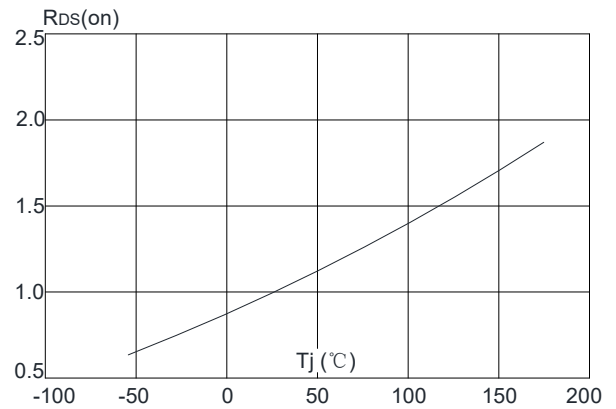
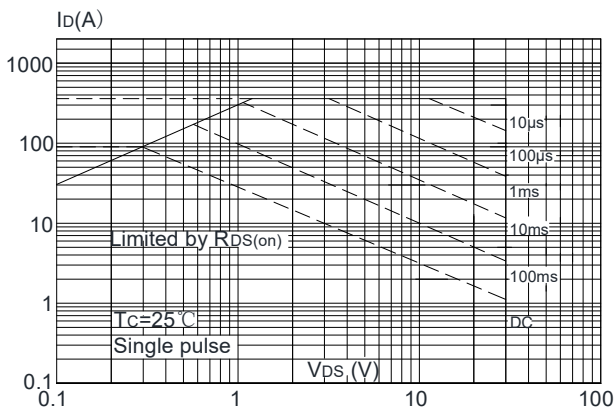
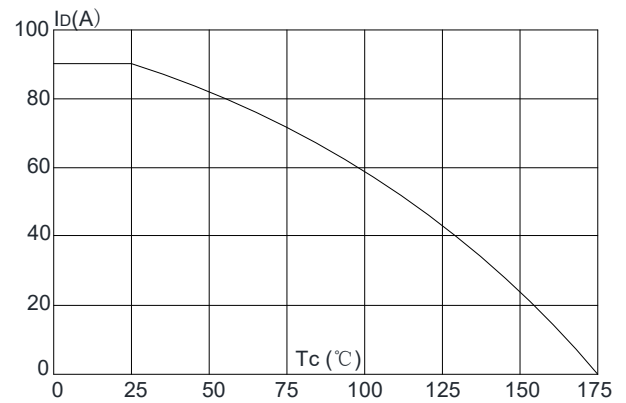
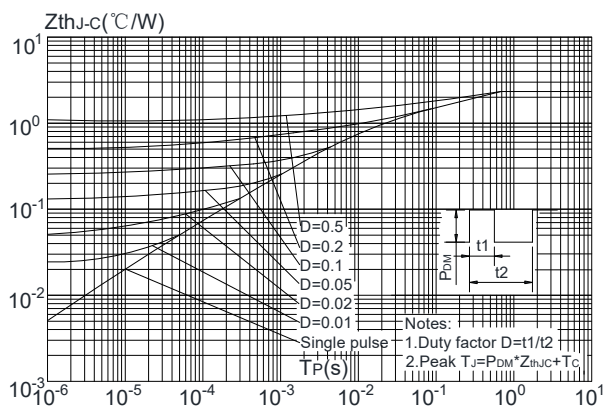
Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition:  $T_J=25^\circ C, V_{DD}=15V, V_G=10V, R_G=25\Omega, L=0.5mH, I_{AS}=19.5A$

3. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 0.5\%$

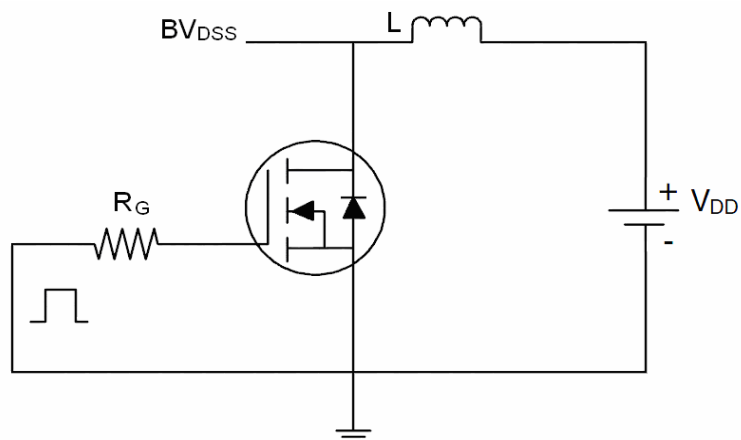
## Typical Characteristics

**Figure 1: Output Characteristics**

**Figure 2: Typical Transfer Characteristics**

**Figure 3: On-resistance vs. Drain Current**

**Figure 4: Body Diode Characteristics**

**Figure 5: Gate Charge Characteristics**

**Figure 6: Capacitance Characteristics**


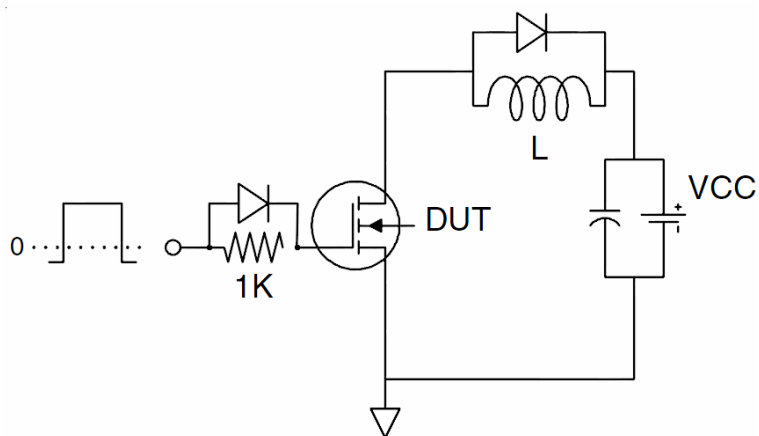
**Figure 7: Normalized Breakdown Voltage vs. Junction Temperature**

**Figure 8: Normalized on Resistance vs. Junction Temperature**

**Figure 9: Maximum Safe Operating Area**

**Figure 10: Maximum Continuous Drain Current vs. Case Temperature**

**Maximum Effective Transient Thermal Impedance, Junction-to-Case**


## Test Circuit

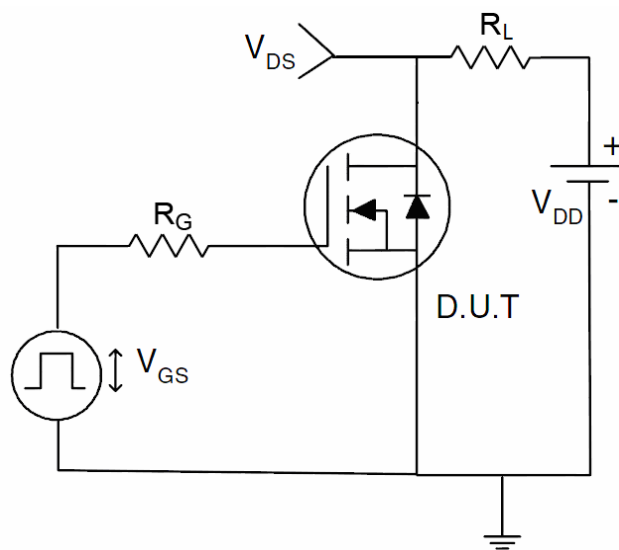
### 1) $E_{AS}$ Test Circuits



### 2) Gate Charge Test Circuit:



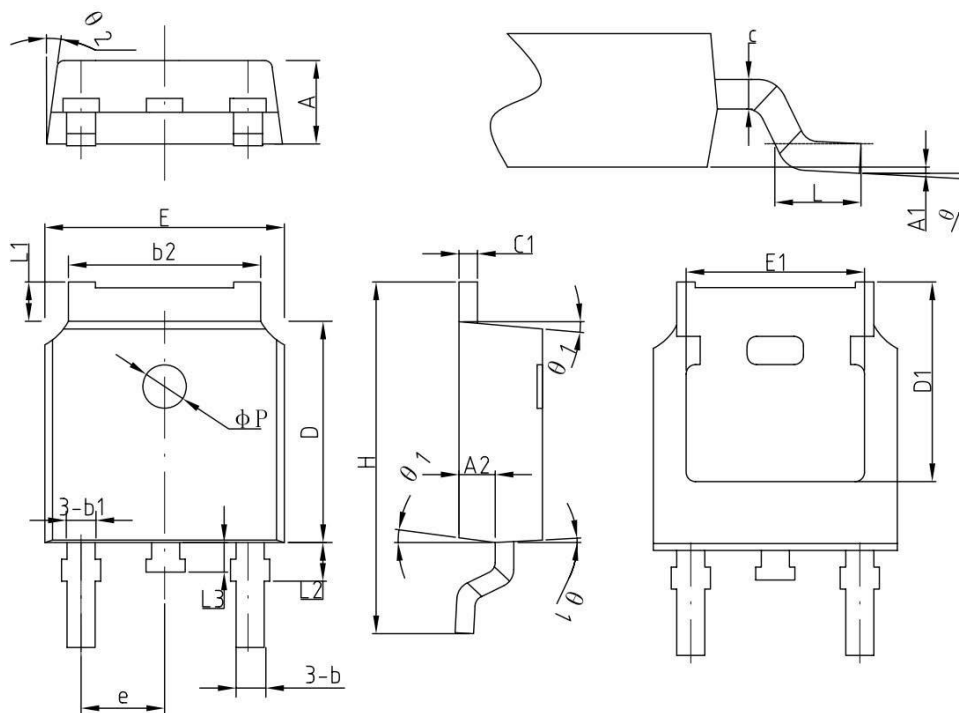
### 3) Switch Time Test Circuit:



## Package Dimension

### TO-252

Unit: mm



COMMON DIMENSIONS  
 (UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	2.2	2.30	2.38
A1	0	—	0.10
A2	0.90	1.01	1.10
b	0.71	0.76	0.86
b1		0.76	
b2	5.13	5.33	5.46
c	0.47	0.50	0.60
c1	0.47	0.50	0.60
D	6.0	6.10	6.20
D1	—	5.30	—
E	6.50	6.60	6.70
E1	—	4.80	—
e	2.286BSC		
H	9.70	10.10	10.40
L	1.40	1.50	1.70
L1	0.90	—	1.25
L2		1.05	
L3		0.8	
φP		1.2	
θ	0°	—	8°
θ 1	5°	7°	9°
θ 2	5°	7°	9°