

## 40V N-Channel MOSFET

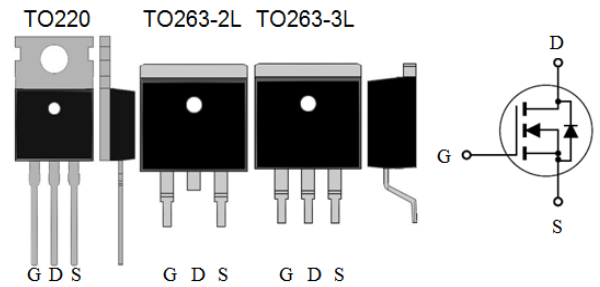
### Applications:

- Power Supply
- DC-DC Converters
- DC-AC Inverters

$V_{DS}$	$R_{DS(ON)}(MAX)$	$I_D$
40V	2.0m $\Omega$	252A

### Features:

- Lead Free
- Low  $R_{DS(ON)}$  to Minimize Conductive Loss
- Low Gate Charge for Fast Switching Application
- Optimized  $V_{(BR)DSS}$  Ruggedness



Pin Definition and Inner Circuit

### Ordering Information

Park Number	Package	Brand
MXP4002AT	TO220	MXP
MXP4002AF	TO263-2L	
MXP4002AE	TO263-3L	

### Absolute Maximum Ratings

$T_c=25^\circ\text{C}$  unless otherwise specified

Symbol	Parameter	Value	Unit
$V_{DSS}$	Drain-to-Source Voltage	40	V
$I_D$	Continuous Drain Current	Silicon Limited	252
		Package Limited	80
$I_{DM}$	Pulsed Drain Current @ $V_{GS}=10\text{V}$	1009	
$P_D$	Power Dissipation	242	W
$V_{GS}$	Gate-to-Source Voltage	+/-20	V
$T_J$ and $T_{stg}$	Operating Junction and Storage Temperature Range	-55 to 175	$^\circ\text{C}$

### Avalanche Characteristics

$T_c=25^\circ\text{C}$  unless otherwise specified

Symbol	Parameter	Value	Unit
$E_{AS}^{\textcircled{1}}$	Single Pulse Avalanche Energy ( $V_{DS}=20\text{V}$ , $V_{GS}=10\text{V}$ , $R_g=25\Omega$ , $L=1\text{mH}$ )	200	mJ
$I_{AS}$	Single Pulse Avalanche Current	Figure 9	A

### Thermal Resistance

Symbol	Parameter	Max	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.62	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62	$^\circ\text{C}/\text{W}$

$\textcircled{1}$  : Guarantee number.

**40V N-Channel MOSFET**
**OFF Characteristics**
 $T_J=25^{\circ}\text{C}$  unless otherwise specified

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	40	-	-	V	$V_{GS}=0V, I_D=250\mu A$
$I_{DSS}$	Drain-to-Source Leakage Current	-	-	1	uA	$V_{DS}=32V, V_{GS}=0V$
		-	-	100		$V_{DS}=32V, V_{GS}=0V, T_J=125^{\circ}\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	-	-	100	nA	$V_{GS}=+20V$
	Gate-to-Source Reverse Leakage	-	-	100		$V_{GS}=-20V$

**ON Characteristics**
 $T_J=25^{\circ}\text{C}$  unless otherwise specified

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	-	1.6	2.0	m $\Omega$	$V_{GS}=10V, I_D=80A$
$V_{GS(th)}$	Gate Threshold Voltage	2	-	4	V	$V_{GS}=V_{DS}, I_D=250\mu A$

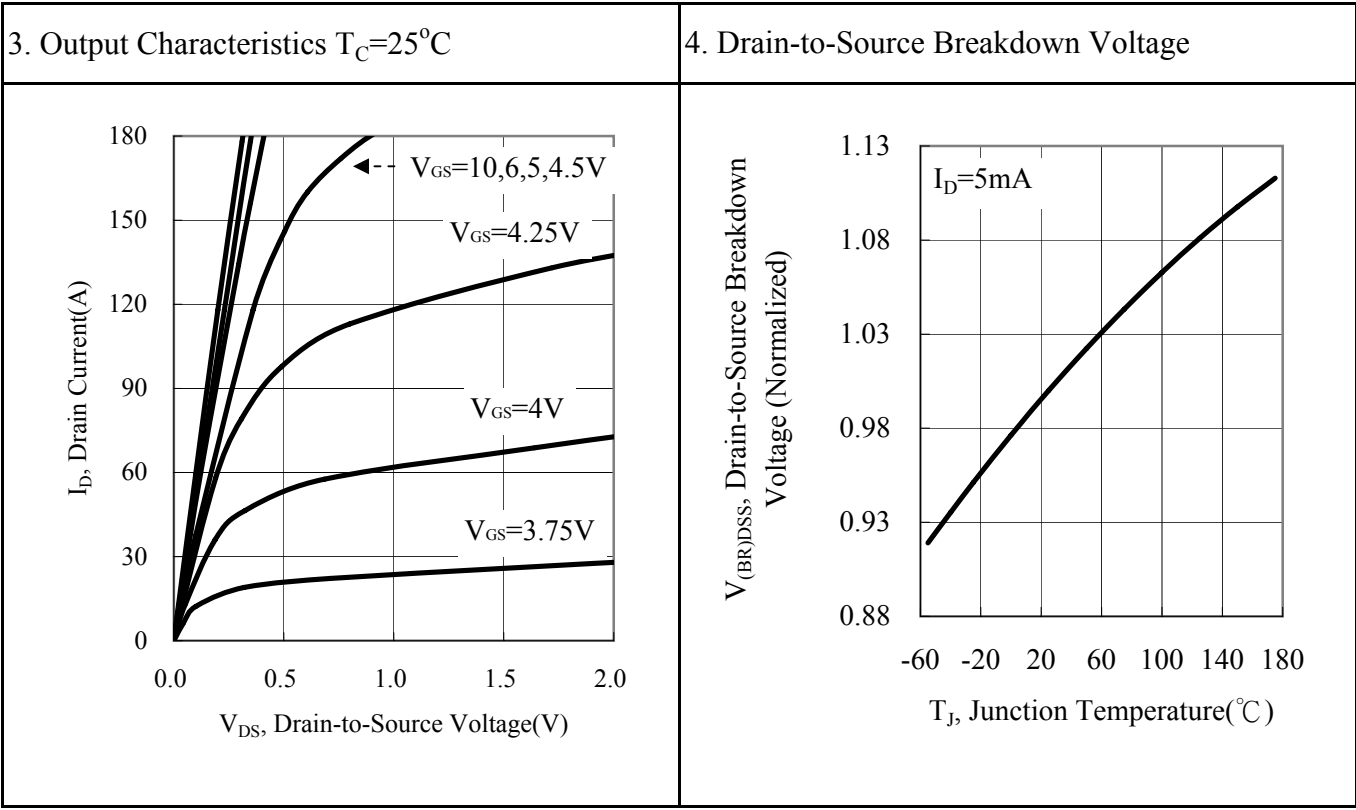
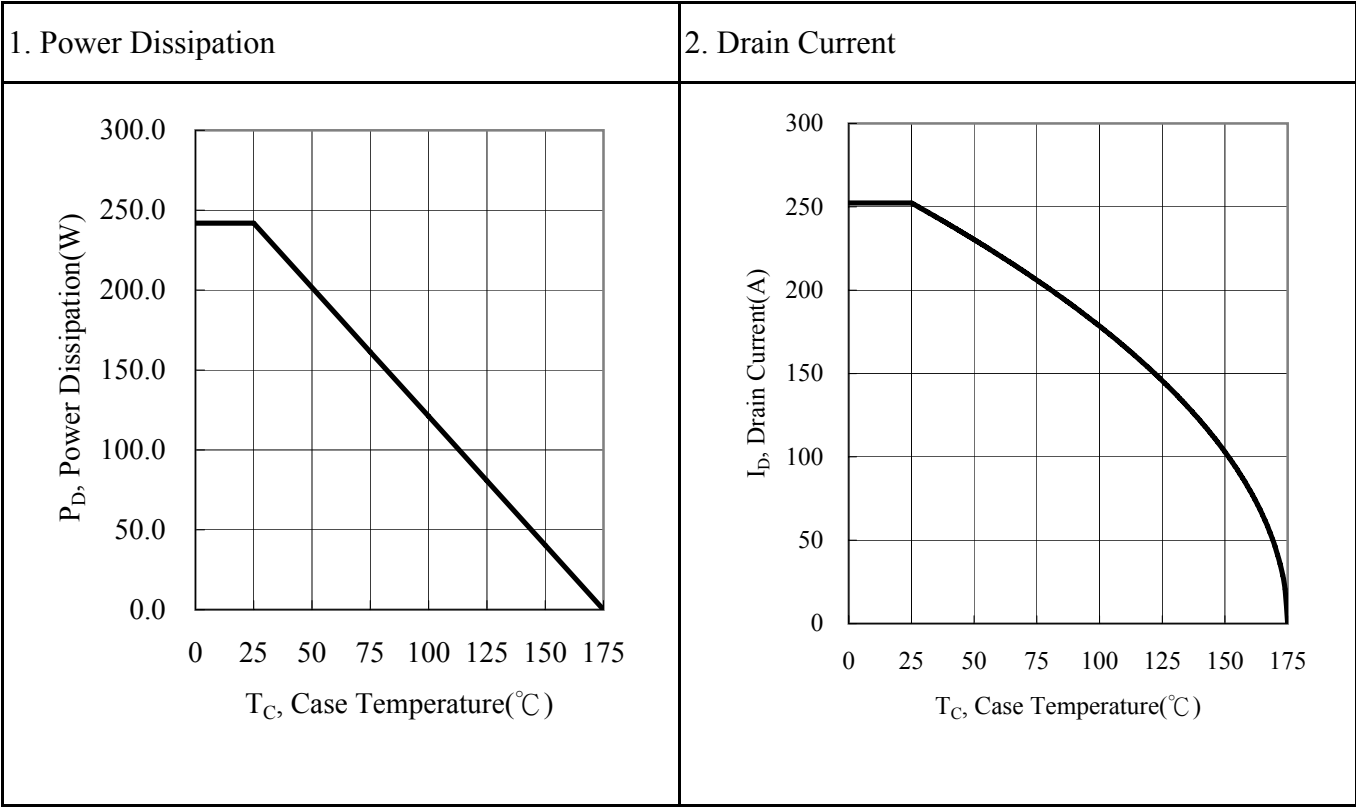
**Dynamic Characteristics**
 $T_J=25^{\circ}\text{C}$  unless otherwise specified

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
$C_{iss}$	Input Capacitance	-	8487.6	-	pF	$V_{GS}=0V, V_{DS}=20V,$ $f=1.0\text{MHz}$
$C_{oss}$	Output Capacitance	-	1182.8	-		
$C_{rss}$	Reverse Transfer Capacitance	-	651.6	-		
$Q_g$	Total Gate Charge	-	136.3	-	nC	$V_{DD}=20V, I_D=80A, V_{GS}=10V$
$Q_{gs}$	Gate-to-Source Charge	-	36.0	-		
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	-	23.4	-		
$T_d(on)$	Turn-on Delay Time	-	30.7	-	ns	$V_{DD}=20V, I_D=40A,$ $V_{GS}=10V, R_G=10\Omega, R_L=0.5\Omega$
$T_r$	Rise Time	-	81.1	-		
$T_d(off)$	Turn-off Delay Time	-	185.7	-		
$T_f$	Fall Time	-	91.3	-		

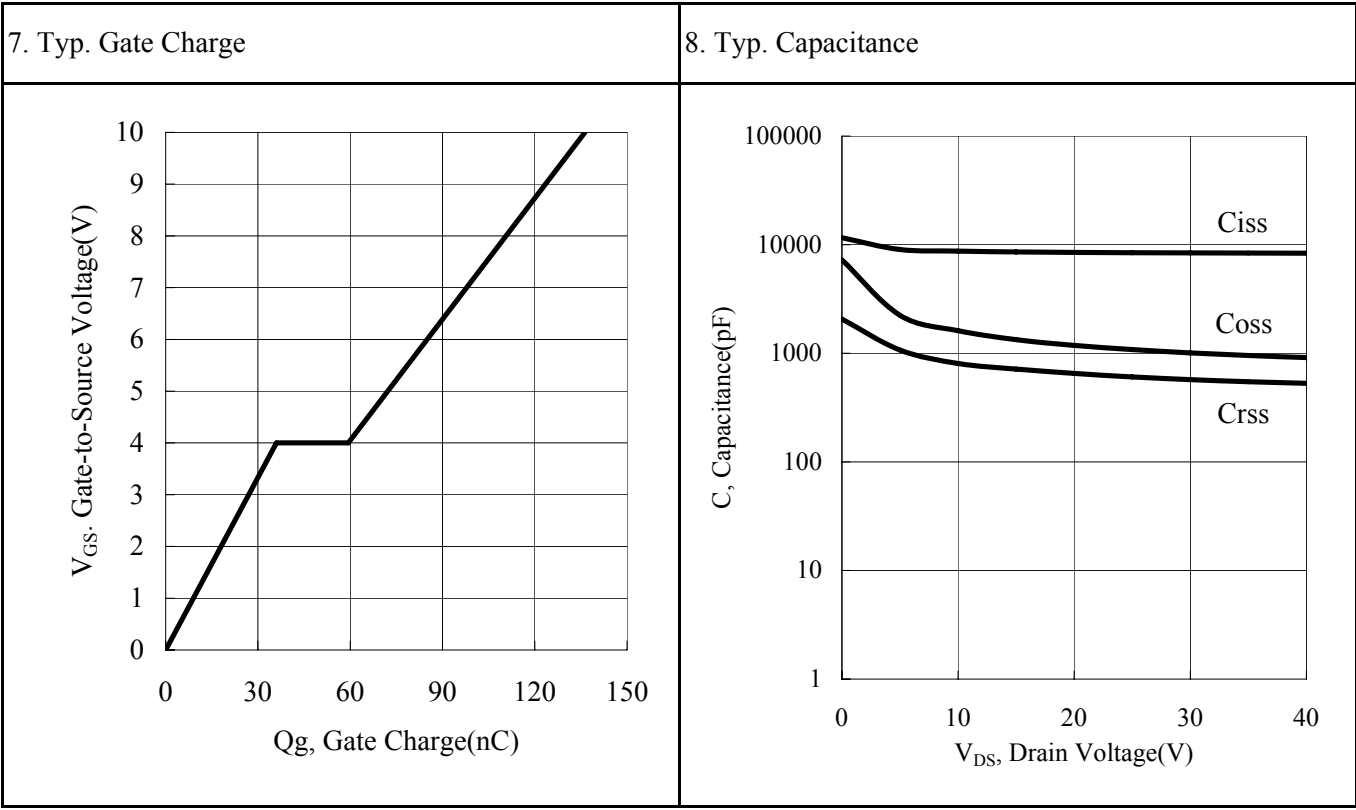
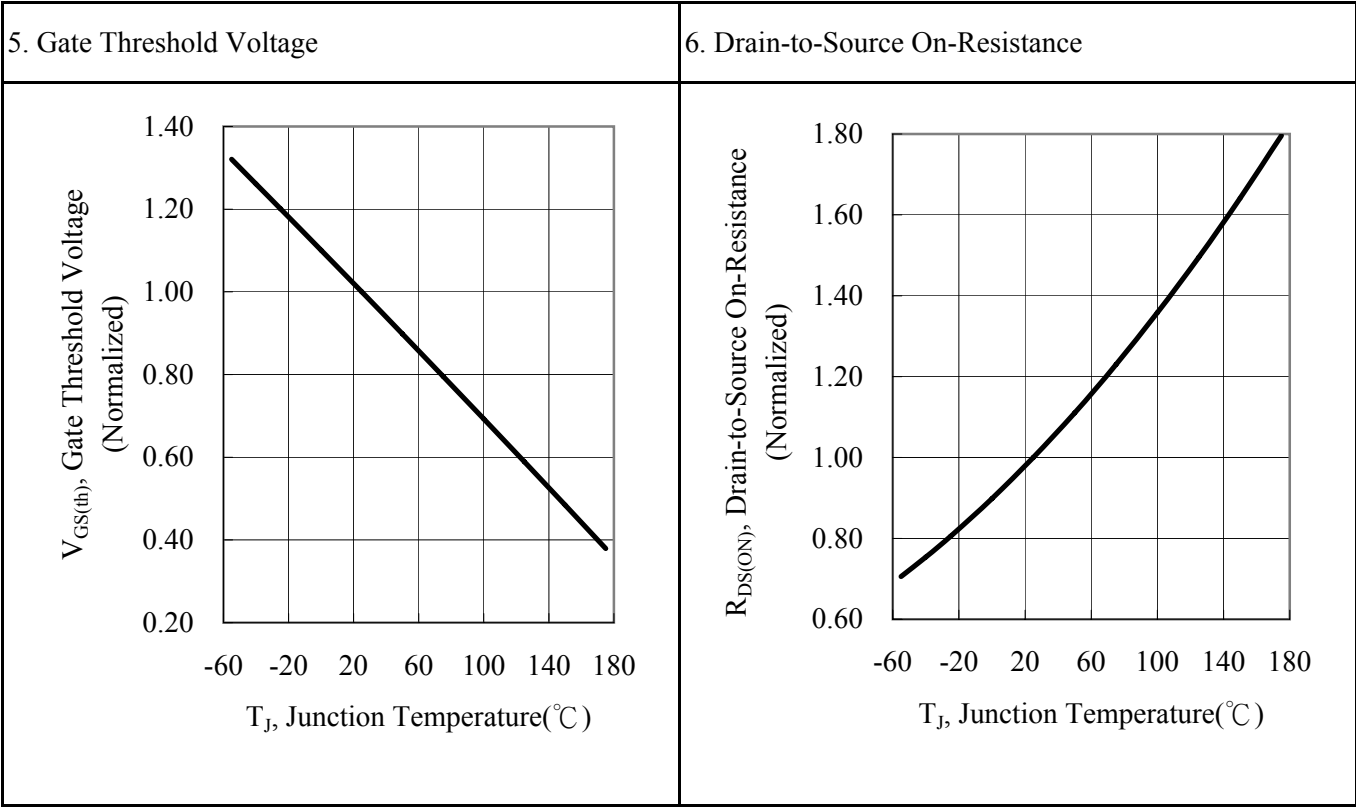
**Source-Drain Diode Characteristics**
 $T_J=25^{\circ}\text{C}$  unless otherwise specified

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
$V_{SD}$	Diode Forward Voltage	-	-	1.2	V	$I_S=80A, V_{GS}=0V$
$T_{rr}$	Reverse Recovery Time	-	69.3	-	ns	$I_S=80A, di/dt=100A/\mu s$
$Q_{rr}$	Reverse Recovery Charge	-	66.2	-	nC	

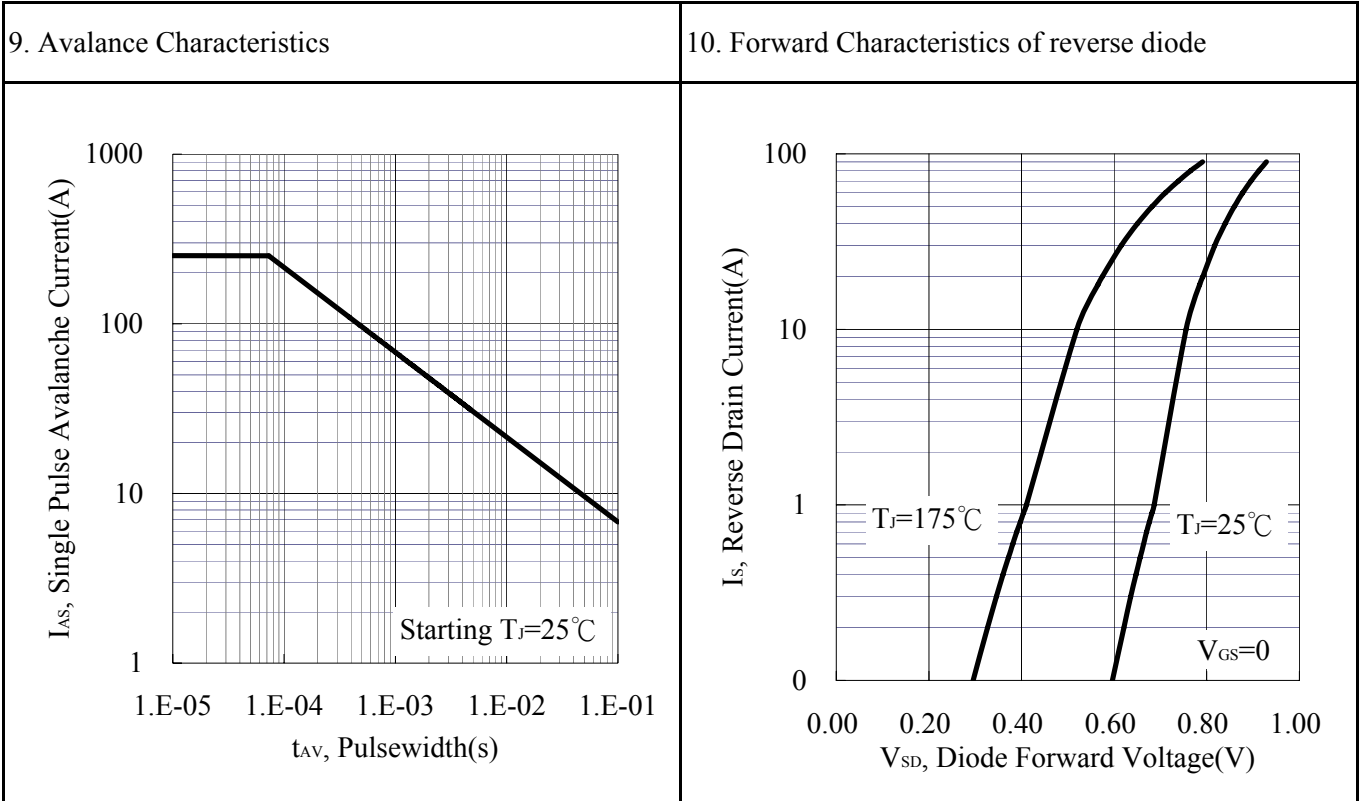
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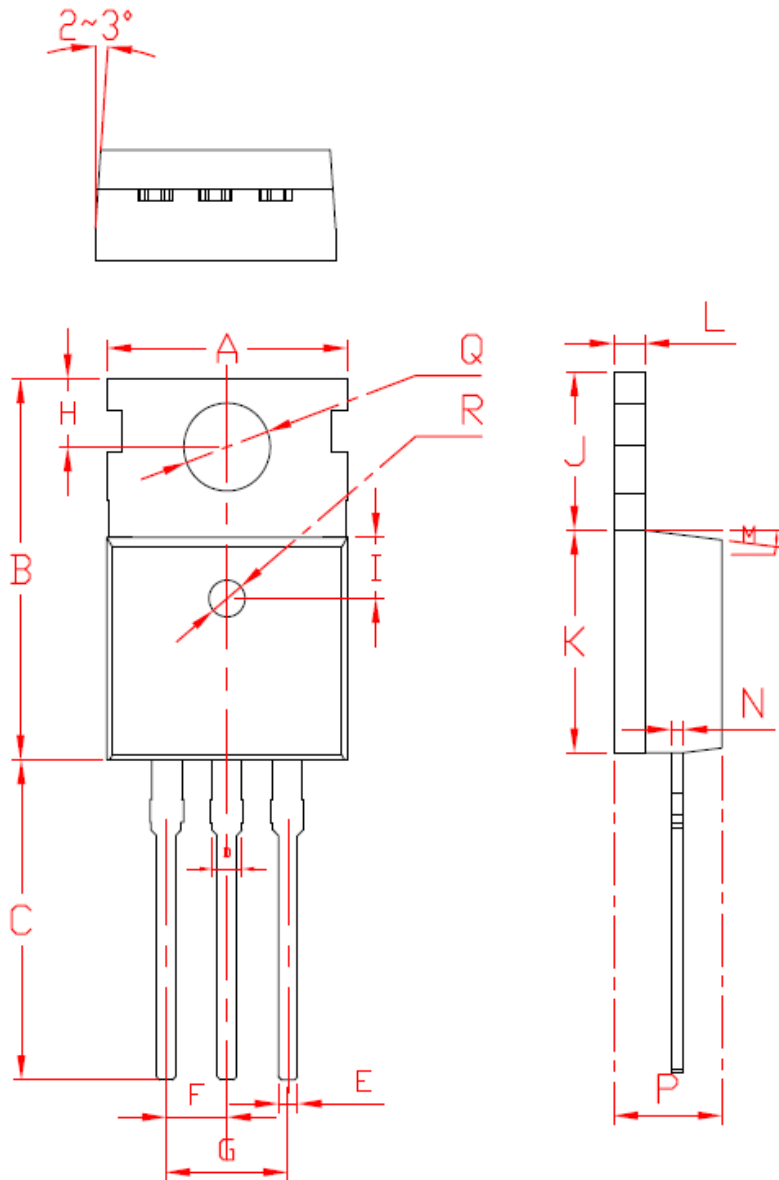


**40V N-Channel MOSFET**



**TO220**

1. Outline Dimension

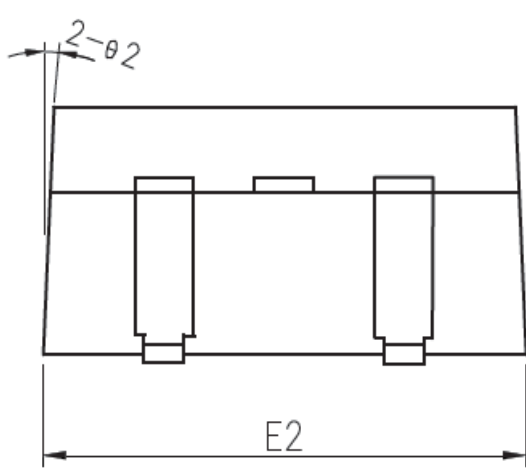
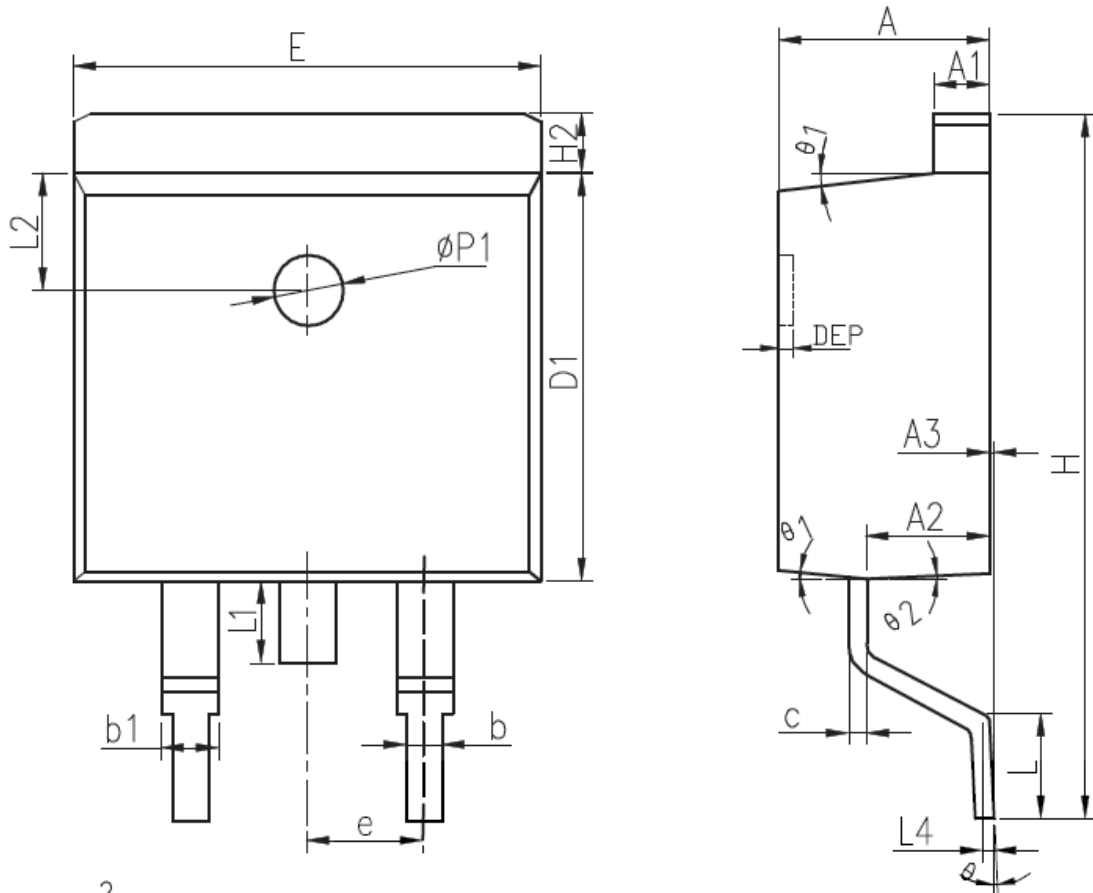


Symbol	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
Min	9.8	15.4	12.75					2.73		6.4	9	1.29		0.48	2.35	4.4	3.5	1.4
Non	10	15.6	13.1	1.31	0.8	2.54	5.08	2.8	2.5	6.5	9.1	1.3	1.27	0.5	2.4	4.5	3.6	1.5
Max	10.2	15.8	13.17					2.87		6.6	9.2	1.32		0.56	2.5	4.7	3.63	1.6

UNIT : mm

**TO263-2L**

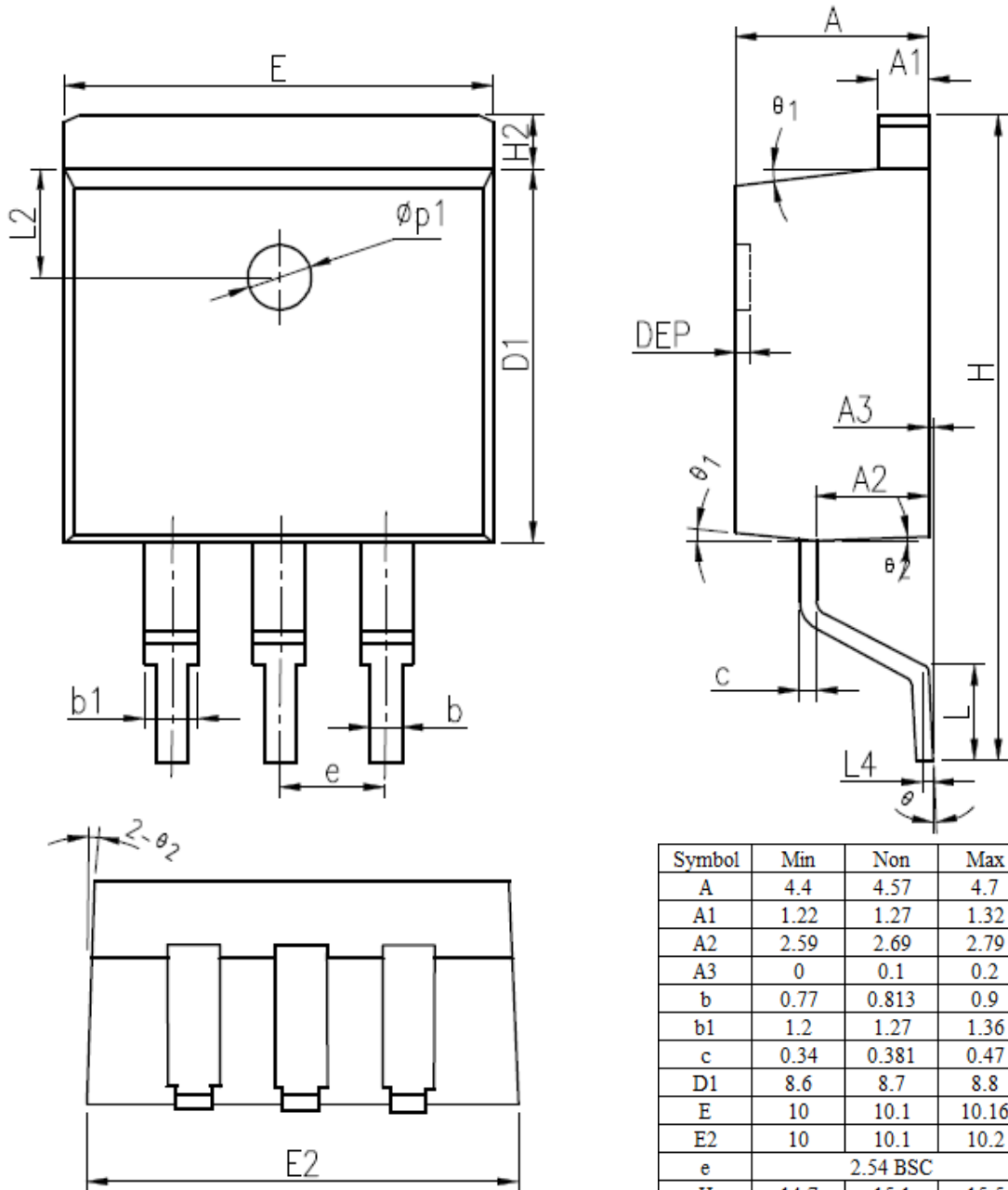
1. Outline Dimension



SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.40	4.57	4.70	0.173	0.180	0.185
A1	1.22	1.27	1.32	0.048	0.050	0.052
A2	2.59	2.69	2.79	0.102	0.106	0.110
A3	0.00	0.10	0.20	0.000	0.004	0.008
b	0.77	0.813	0.90	0.030	0.032	0.035
b1	1.20	1.270	1.36	0.047	0.050	0.054
c	0.34	0.381	0.47	0.013	0.015	0.019
D1	8.60	8.70	8.80	0.339	0.343	0.346
E	10.00	10.16	10.26	0.394	0.400	0.404
E2	10.00	10.10	10.20	0.394	0.398	0.402
e	2.54 BSC			0.100 BSC		
H	14.70	15.10	15.50	0.579	0.594	0.610
H2	1.17	1.27	1.40	0.046	0.050	0.055
L	2.00	2.30	2.60	0.079	0.091	0.102
L1	1.45	1.55	1.70	0.057	0.061	0.067
L2	2.50 REF			0.098 REF		
L4	0.25 BSC			0.010 BSC		
theta	0°	5°	8°	0°	5°	8°
theta1	5°	7°	9°	5°	7°	9°
theta2	1°	3°	5°	1°	3°	5°
phi P1	1.40	1.50	1.60	0.055	0.059	0.063
DEP	0.05	0.10	0.20	0.002	0.004	0.008

**TO263-3L**

## 1. Outline Dimension



Symbol	Min	Non	Max
A	4.4	4.57	4.7
A1	1.22	1.27	1.32
A2	2.59	2.69	2.79
A3	0	0.1	0.2
b	0.77	0.813	0.9
b1	1.2	1.27	1.36
c	0.34	0.381	0.47
D1	8.6	8.7	8.8
E	10	10.1	10.16
E2	10	10.1	10.2
e	2.54 BSC		
H	14.7	15.1	15.5
H2	1.17	1.27	1.4
L	2	2.3	2.6
L2	2.5 REF		
L4	0.25 BSC		
theta	0	5	8
theta 1	5	7	9
theta 2	1	3	5
Phi P1	1.4	1.5	1.6
DEP	0.05	0.1	0.2

UNIT : mm



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