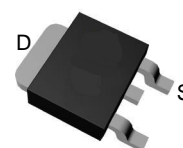


**N-Channel Enhancement Mode MOSFET****Features**

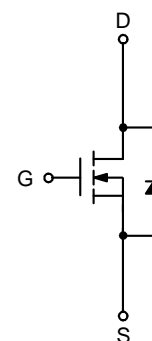
- 40V/60A,  
 $R_{DS(ON)}=7.2m\Omega$  (Typ.) @  $V_{GS}=10V$   
 $R_{DS(ON)}=9.2m\Omega$  (Typ.) @  $V_{GS}=4.5V$
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

**Applications**

- Power Management in Desktop Computer or DC/DC Converters.

**Pin Description**

Top View of TO-252-2



N-Channel MOSFET

## Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit	
<b>Common Ratings</b> ( $T_A=25^\circ\text{C}$ Unless Otherwise Noted)				
$V_{DSS}$	Drain-Source Voltage	40	V	
$BV_{DS(Avalanche)}^*$	Drain-Source Avalanche Voltage (Maximum)	45		
$V_{GSS}$	Gate-Source Voltage	$\pm 20$		
$T_J$	Maximum Junction Temperature	175	$^\circ\text{C}$	
$T_{STG}$	Storage Temperature Range	-55 to 175	$^\circ\text{C}$	
$I_S$	Diode Continuous Forward Current	40	A	
$I_{DP}$	300 $\mu\text{s}$ Pulse Drain Current Tested	$T_C=25^\circ\text{C}$	160	A
		$T_C=100^\circ\text{C}$	90	
$I_D$	Continuous Drain Current	$T_C=25^\circ\text{C}$	60***	A
		$T_C=100^\circ\text{C}$	48	
$P_D$	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	60	W
		$T_C=100^\circ\text{C}$	30	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	2.5	$^\circ\text{C/W}$	
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	50	$^\circ\text{C/W}$	
$E_{AS}^{**}$	Drain-Source Avalanche Energy	L=0.5mH	100	mJ

Notes :

\* Avalanche single pulse test and avalanche period time  $t_{av} \leq 100 \mu\text{s}$ , duty < 1% .

\*\* Avalanche test condition:  $T_J=25^\circ\text{C}$ , L=0.5mH,  $I_{AS}=20\text{A}$ ,  $V_{DD}=30\text{V}$ , and  $V_{GS}=10\text{V}$ .

\*\*\* Current limited by bond wire.

**Electrical Characteristics (Cont.)** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

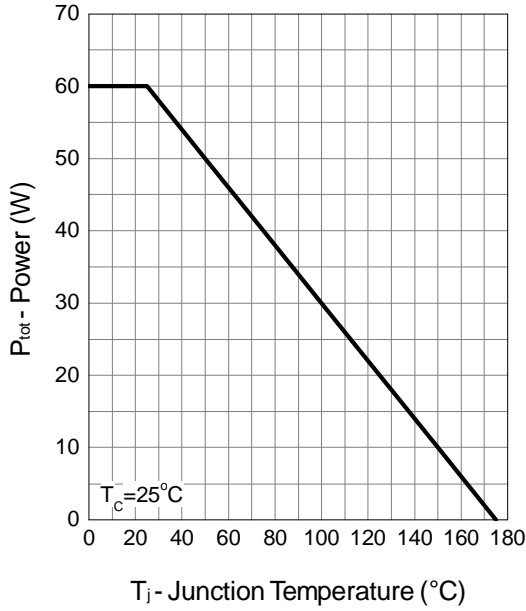
Symbol	Parameter	Test Conditions	XP4184			Unit
			Min.	Typ.	Max.	
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	40	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=32V, V_{GS}=0V$	-	-	1	$\mu A$
		$T_J=85^\circ C$	-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	1.2	1.6	2	V
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
$R_{DS(ON)}^a$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=20A$	-	7.2	9	m $\Omega$
		$V_{GS}=4.5V, I_{DS}=10A$	-	9.2	13	
<b>Diode Characteristics</b>						
$V_{SD}^a$	Diode Forward Voltage	$I_{SD}=20A, V_{GS}=0V$	-	0.8	1.1	V
$t_{rr}$	Reverse Recovery Time	$I_{DS}=40A,$ $di_{SD}/dt=100A/\mu s$	-	28	-	ns
$Q_{rr}$	Reverse Recovery Charge		-	24	-	nC
<b>Dynamic Characteristics<sup>b</sup></b>						
$R_G$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1MHz$	-	1.4	-	$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=20V,$ Frequency=1.0MHz	-	1460	-	pF
$C_{oss}$	Output Capacitance		-	180	-	
$C_{riss}$	Reverse Transfer Capacitance		-	146	-	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=20V, R_L=20\Omega,$ $I_{DS}=1A, V_{GEN}=10V,$ $R_G=6\Omega$	-	11	21	ns
$t_r$	Turn-on Rise Time		-	13	24	
$t_{d(OFF)}$	Turn-off Delay Time		-	37	67	
$t_f$	Turn-off Fall Time		-	11	21	
<b>Gate Charge Characteristics<sup>b</sup></b>						
$Q_g$	Total Gate Charge	$V_{DS}=20V, V_{GS}=10V,$ $I_{DS}=40A$	-	31.2	44	nC
$Q_{gs}$	Gate-Source Charge		-	3.8	-	
$Q_{gd}$	Gate-Drain Charge		-	9	-	

Note a : Pulse test ; pulse width $\leq 300\mu s$ , duty cycle $\leq 2\%$ .

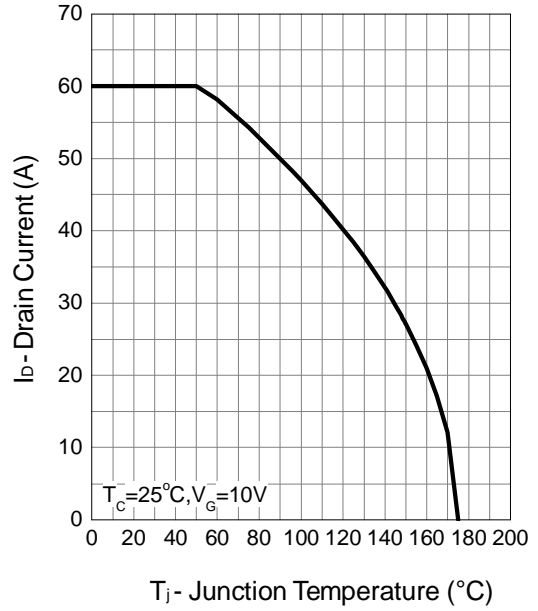
Note b : Guaranteed by design, not subject to production testing.

## Typical Operating Characteristics

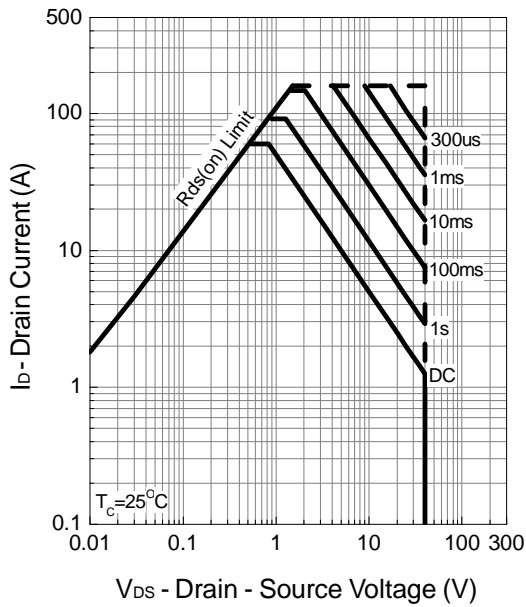
Power Dissipation



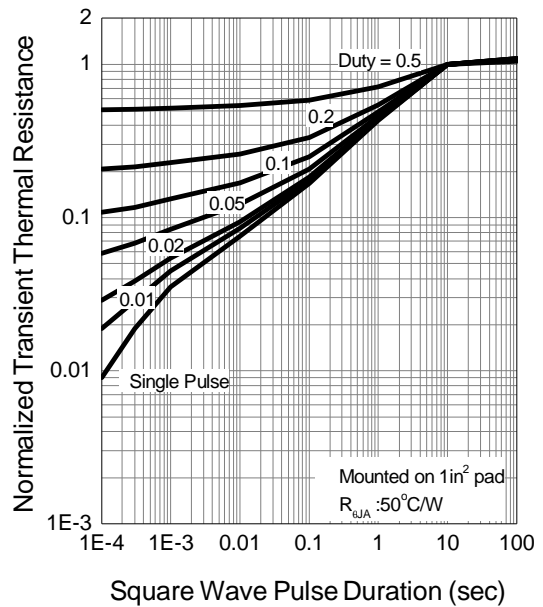
Drain Current



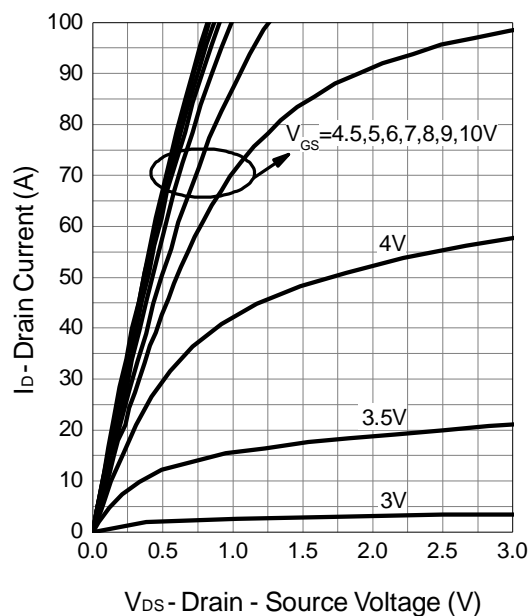
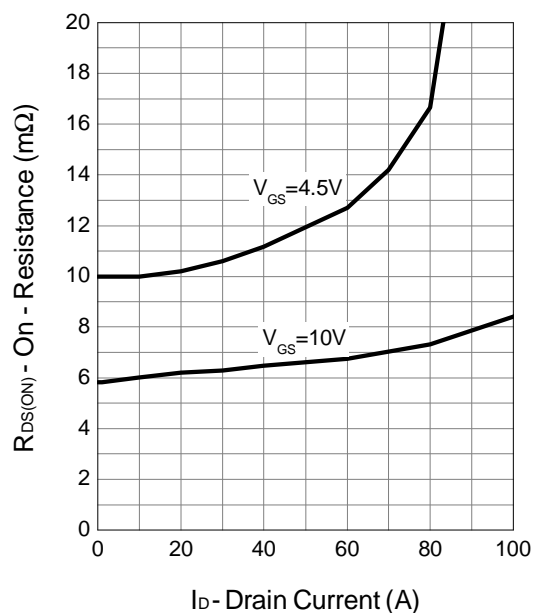
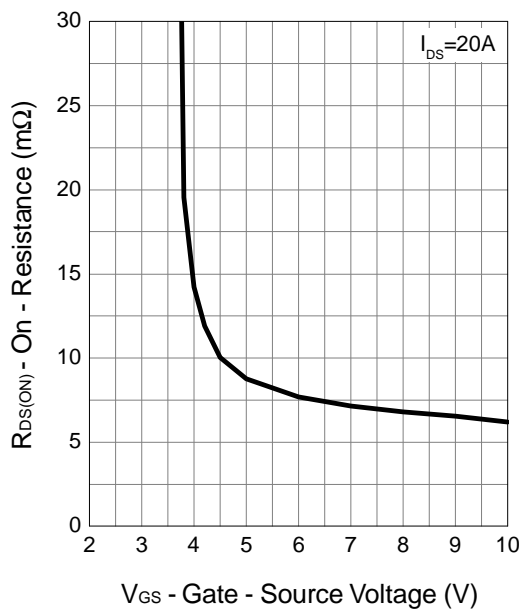
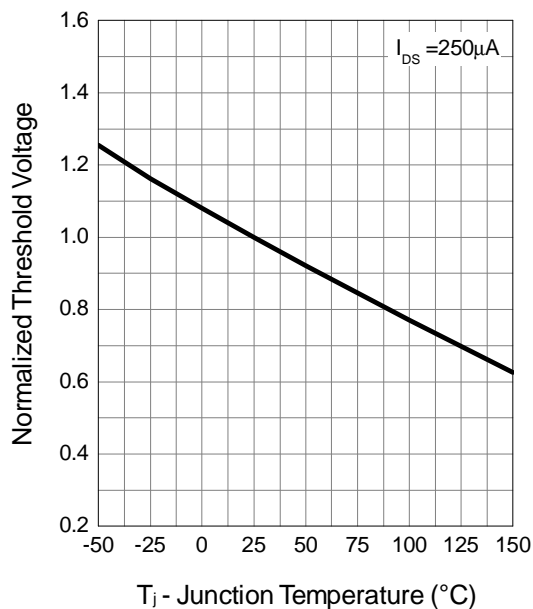
Safe Operation Area



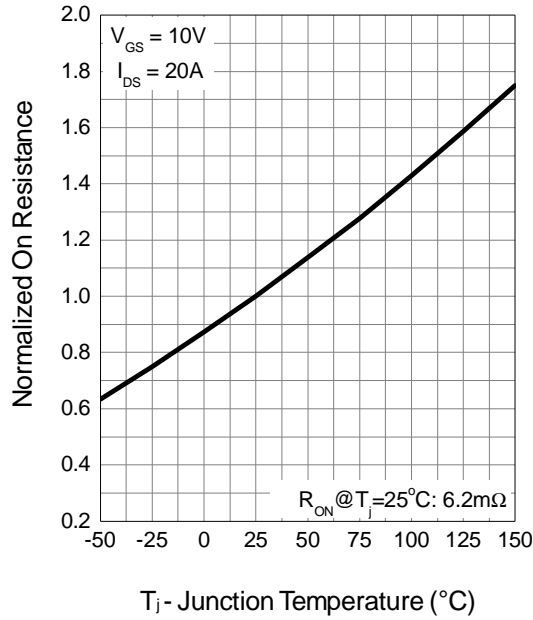
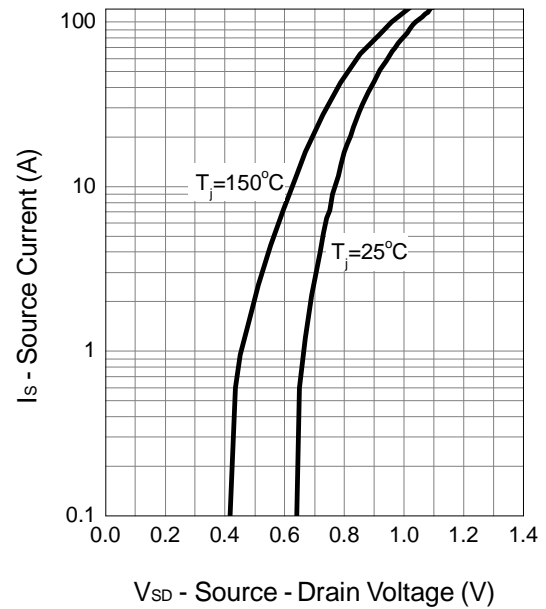
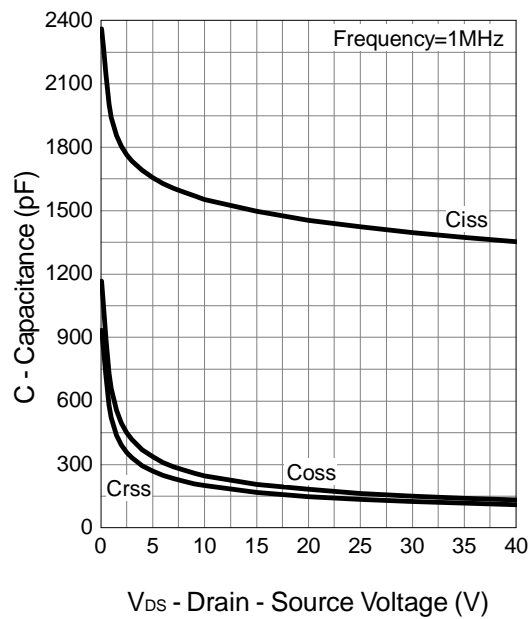
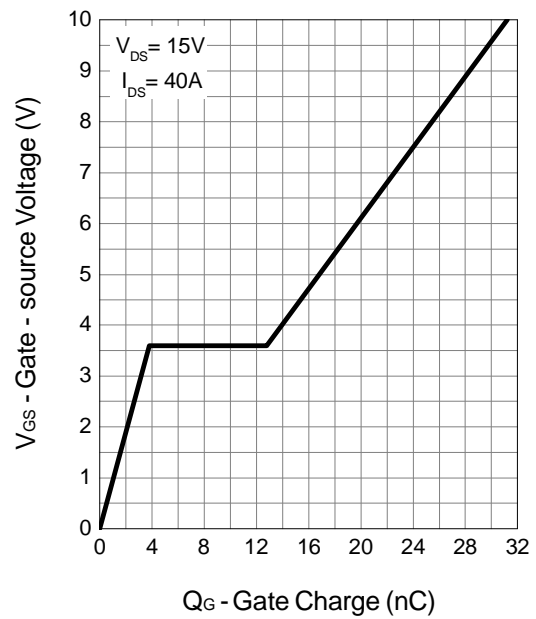
Thermal Transient Impedance



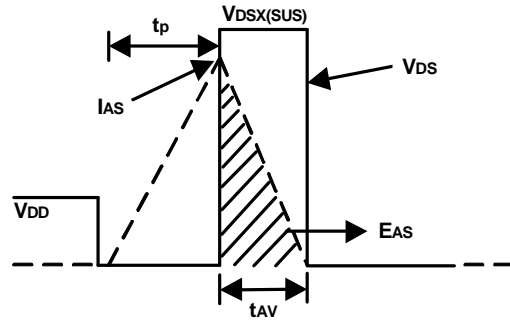
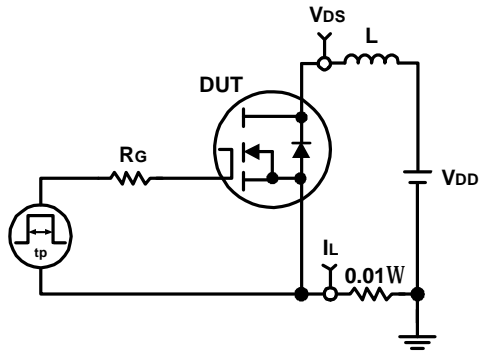
## Typical Operating Characteristics (Cont.)

**Output Characteristics**

**Drain-Source On Resistance**

**Gate-Source On Resistance**

**Gate Threshold Voltage**


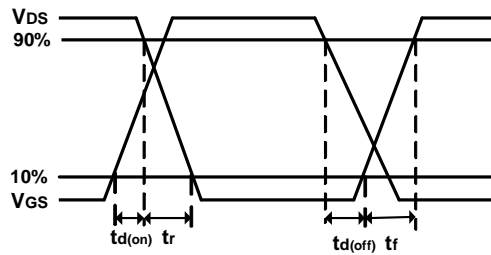
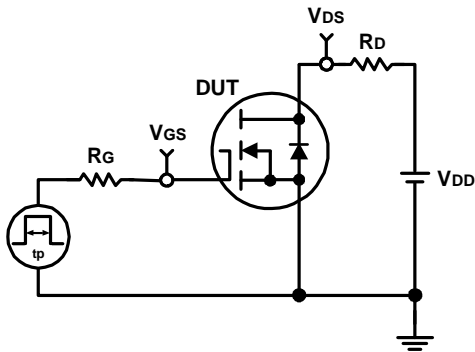
## Typical Operating Characteristics (Cont.)

**Drain-Source On Resistance**

**Source-Drain Diode Forward**

**Capacitance**

**Gate Charge**


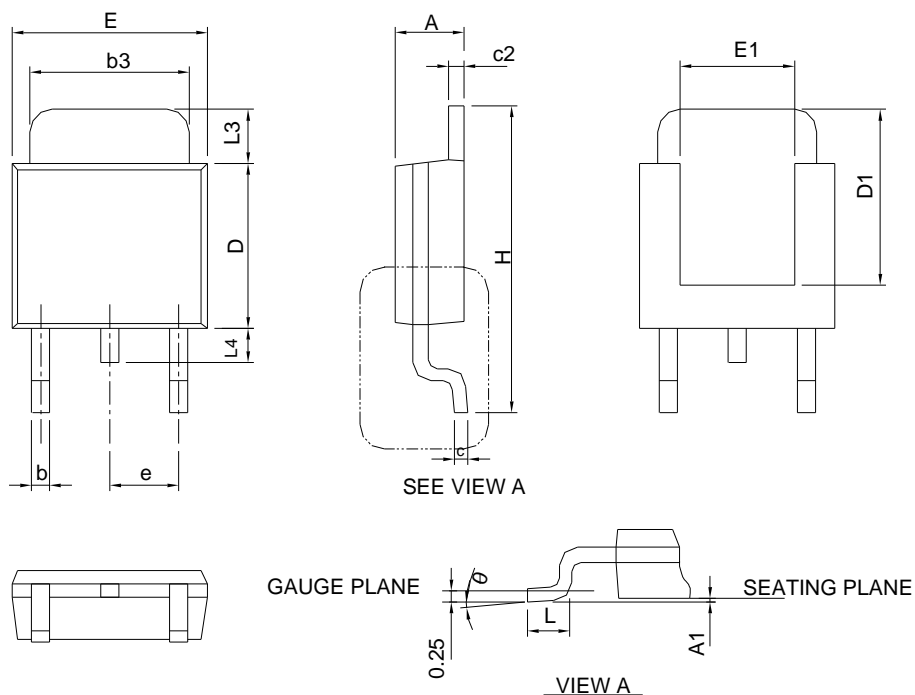
### Avalanche Test Circuit and Waveforms



### Switching Time Test Circuit and Waveforms

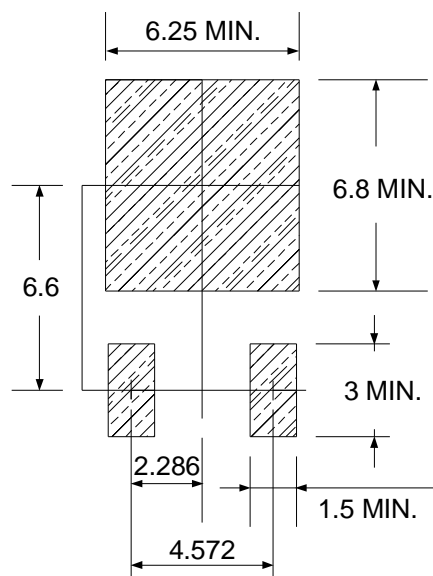


# Package Information

**TO-252-2**


DIMENSIONS	TO-252-3			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.39	0.086	0.094
A1	-	0.13	-	0.005
b	0.50	0.89	0.020	0.035
b3	4.95	5.46	0.195	0.215
c	0.46	0.61	0.018	0.024
c2	0.46	0.89	0.018	0.035
D	5.33	6.22	0.210	0.245
D1	4.57	6.00	0.180	0.236
E	6.35	6.73	0.250	0.265
E1	3.81	6.00	0.150	0.236
e	2.29 BSC		0.090 BSC	
H	9.40	10.41	0.370	0.410
L	0.90	1.78	0.035	0.070
L3	0.89	2.03	0.035	0.080
L4	-	1.02	-	0.040
θ	0°	8°	0°	8°

Note : Follow JEDEC TO-252 .

**RECOMMENDED LAND PATTERN**


UNIT: mm