

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	$I_D$
-60V	6mΩ@-10V	-140A
	7.3mΩ@-4.5V	

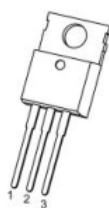
## Feature

- High switching speed
- Improved dv/dt capability
- Low Gate Charge
- Low reverse transfer capacitance

## Application

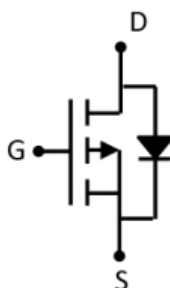
- Load Switches, Adaptor Switch
- Notebook PCs

## Package



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

## Circuit diagram



## Marking



**60P05B =Device Code**  
**\*\* =Week Code**

## Absolute maximum ratings

(T<sub>a</sub>=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DS</sub>	-60	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Drain Current-Continuous (T <sub>c</sub> =25°C)	I <sub>D</sub>	-140	A
Pulsed Drain Current	I <sub>DM</sub>	-560	A
Single Pulse Avalanche Energy	E <sub>AS</sub>	227	mJ
Maximum Power Dissipation (T <sub>c</sub> =25°C)	P <sub>D</sub>	375	W
Thermal Resistance, Junction-to-Case	R <sub>θJC</sub>	0.33	°C/W
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55~+150	°C

## Electrical characteristics

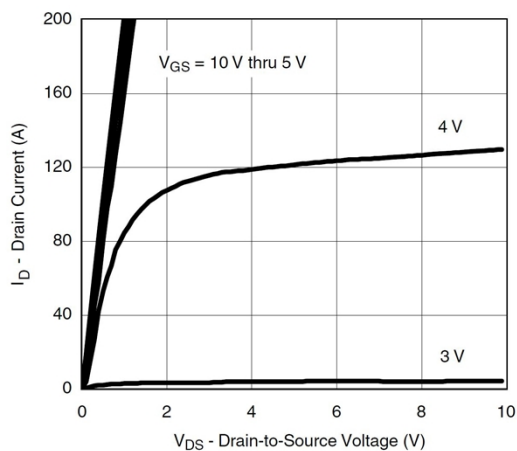
( $T_A=25^{\circ}\text{C}$ , unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$BV_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-60			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -48V, V_{GS} = 0V$			-1	$\mu A$
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$			$\pm 100$	$\mu A$
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-1	-1.5	-2	V
Drain-Source On-Resistance <sup>1</sup>	$R_{DS(on)}$	$V_{GS} = -10V, I_D = -30A$		6	7.5	m $\Omega$
		$V_{GS} = -4.5V, I_D = -20A$		7.3	9.8	
Dynamic Characteristics						
Input Capacitance	$C_{iss}$	$V_{DS} = -25V, V_{GS} = 0V,$ $f = 1MHz$		11431		pF
Output Capacitance	$C_{oss}$			1189		
Reverse Transfer Capacitance	$C_{rss}$			864		
Switching Characteristics						
Turn-on Delay Time	$T_{d(on)}$	$V_{DD} = -30V, R_L = 0.27\Omega,$ $V_{GEN} = -10V, R_{GEN} = 1\Omega$		19.8		nS
Turn-on Rise Time	$T_r$			26.1		
Turn-off Delay Time	$T_{d(off)}$			114		
Turn-off Fall Time	$T_f$			52.7		
Total Gate Charge	$Q_g$	$V_{GS} = -30V, V_{DS} = -10V,$ $I_D = -110A$		235.5		nC
Gate-Source Charge	$Q_{gs}$			52.1		
Gate-Drain Charge	$Q_{gd}$			63.2		
Drain-Source Diode Characteristics						
Diode Forward Voltage	$V_{SD}$	$I_{SD} = -1A, V_{GS} = 0V$			-1.2	V

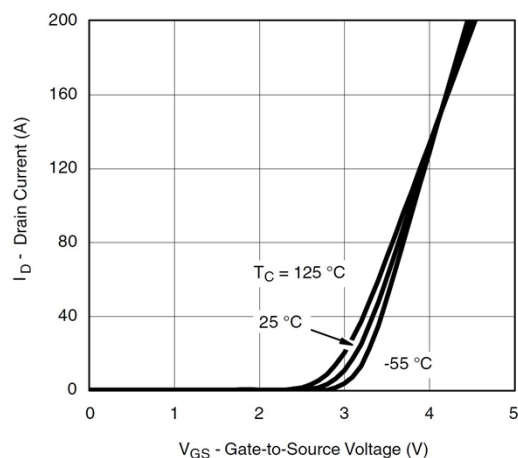
### Note:

1. EAS condition:  $T_j = 25^{\circ}\text{C}, V_{DD} = -30V, V_G = -10V, L = 0.1mH, R_g = 25\Omega$

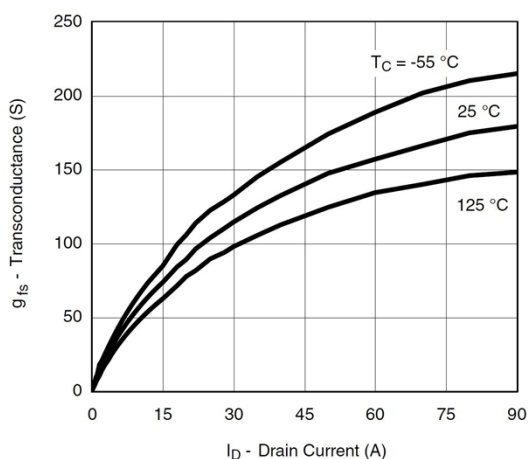
## Typical Characteristics



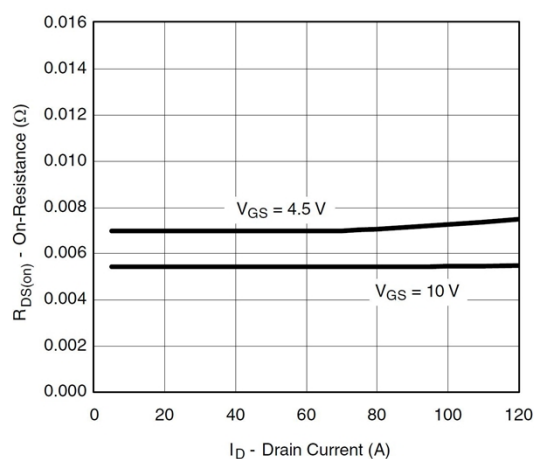
Output Characteristics



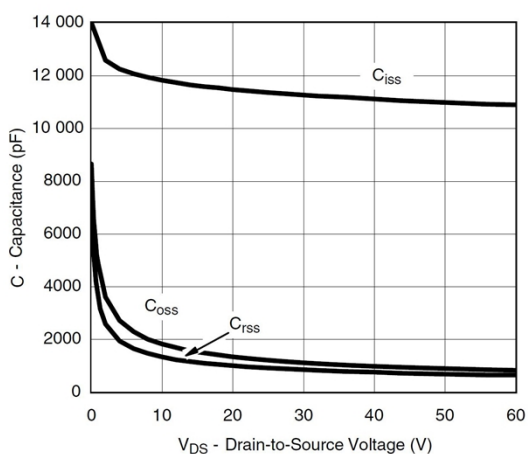
Transfer Characteristics



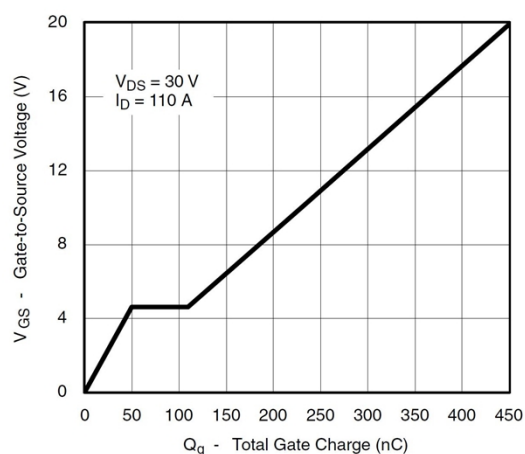
Transconductance



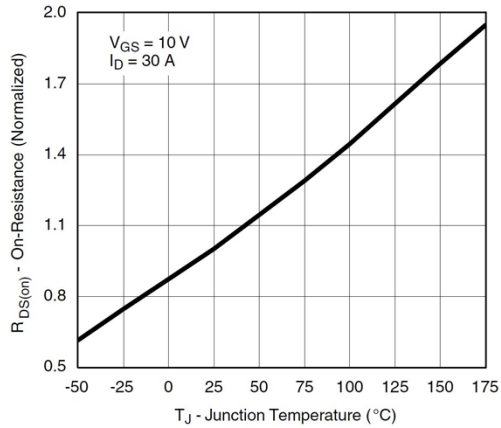
On-Resistance vs. Drain Current



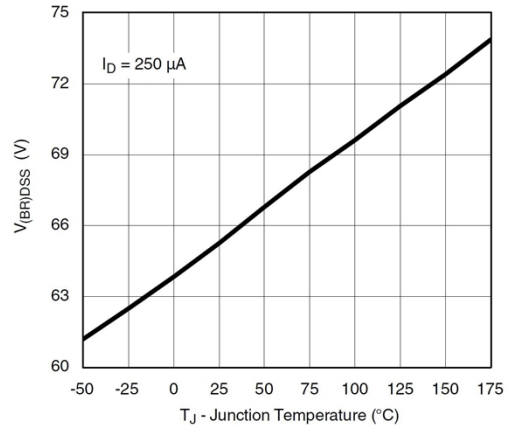
Capacitance



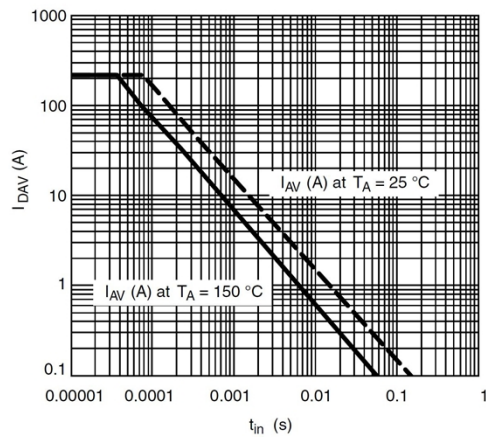
Gate Charge



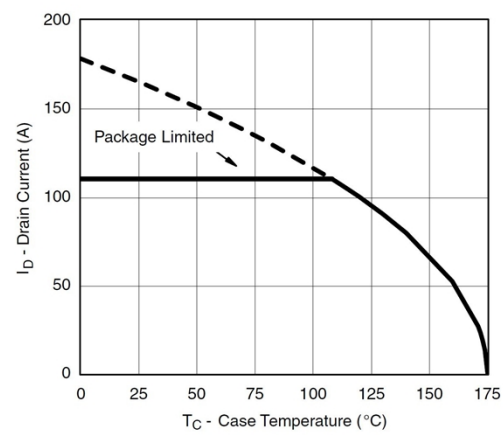
On-Resistance vs. Junction Temperature



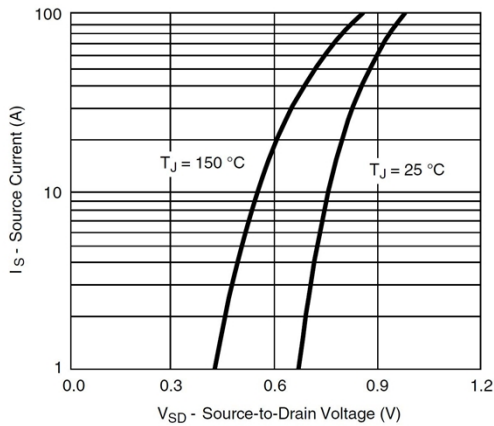
Drain Source Breakdown vs. Junction Temperature



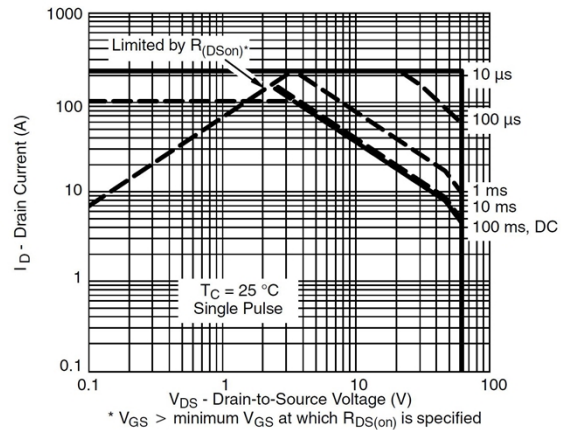
Avalanche Current vs. Time



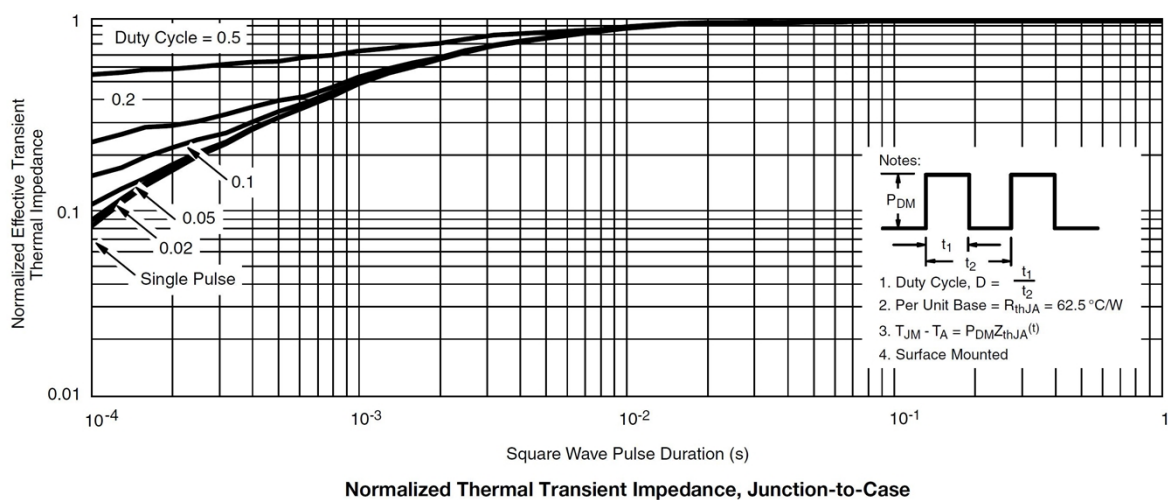
Maximum Avalanche and Drain Current vs. Case Temperature



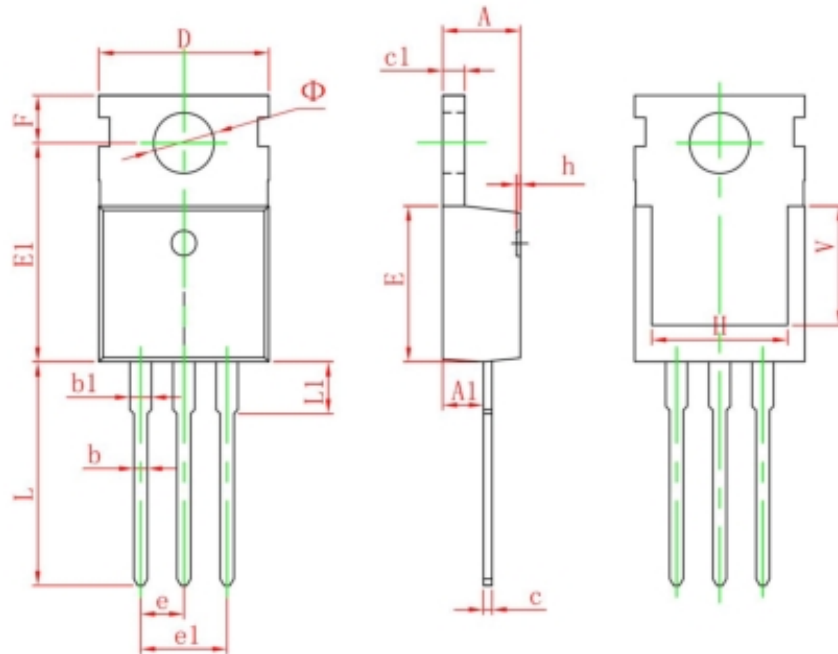
Source-Drain Diode Forward Voltage



Safe Operating Area



## 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