

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
60V	13.5mΩ@10V	10A
	16.5mΩ@4.5V	

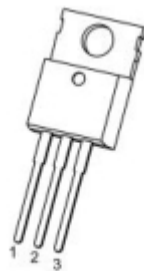
Feature

- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high EAS
- Excellent package for good heat dissipation

Applications

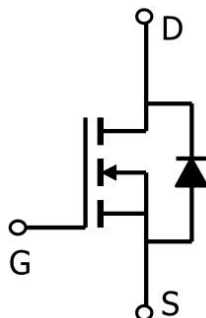
- Power Management
- Switched mode power supply

Package

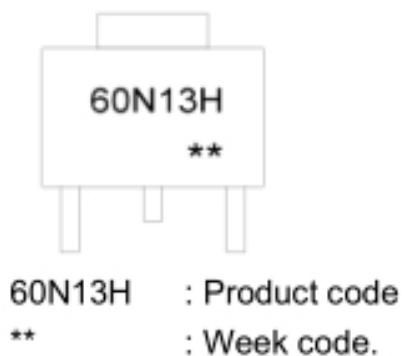


TO-220-3L-C(1:G 2:D 3:S)

Circuit diagram



Marking



Absolute maximum ratings

(T_a=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V _{DS}	60	V
Gate-Source Voltage	V _{GS}	±20	V
Drain Current-Continuous (T _C =25°C)	I _D	50	A
Drain Current-Continuous (T _C =100°C)	I _{D (100°C)}	35.4	A
Pulsed Drain Current (T _C =25°C)	I _{DM}	200	A
Maximum Power Dissipation	P _D	85	W
Single pulse avalanche energy ^(Note 5)	E _{AS}	300	mJ
Thermal Resistance,Junction-to-Case ^(Note 2)	R _{θJC}	1.47	°C/W
Operating Junction and Storage Temperature Range	T _{STG., T_J}	-55 to 150	°C

Electrical characteristics

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

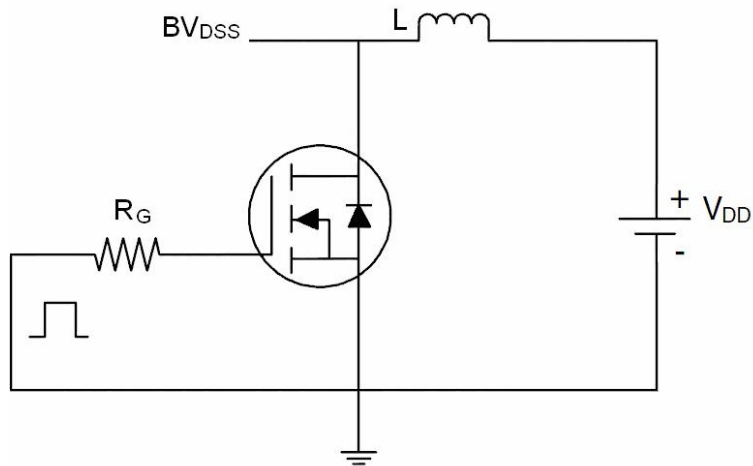
Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$BV_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	60			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 60V, V_{GS} = 0V$			1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 100	μA
On Characteristics ^(Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2	3	4	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 20A$		13	17	m Ω
		$V_{GS} = 5V, I_D = 20A$	18			
Dynamic Characteristics ^(Note 4)						
Input capacitance	C_{iss}	$V_{DS} = 30V, V_{GS} = 0V, f = 1MHz$		2050		pF
Output capacitance	C_{oss}			158		
Reverse transfer capacitance	C_{rss}			120		
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	$T_{d(on)}$	$V_{DD} = 30V, R_G = 6.7\Omega, V_{GS} = 10V, I_D = 3A$		7.4		nS
Turn-on Rise Time	T_r			5.1		
Turn-Off Delay Time	$T_{d(off)}$			28.2		
Turn-Off Fall Time	t_f			5.5		
Total Gate Charge	Q_g	$V_{DS} = 30V, I_D = 20A, V_{GS} = 10V,$		50		pF
Gate-Source Charge	Q_{gs}			6		
Gate-Drain Charge	Q_{gd}			15		
Drain-Source Body Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V_{SD}	$V_{GS} = 0V, I_S = 20A$			1.2	V
Diode Forward Current ^(Note 2)	I_S				50	A
Reverse Recovery Time	t_{rr}	$T_J = 25^{\circ}C, I_F = 20A$		28		nS
Reverse Recovery Charge	Q_{rr}	$di/dt = 100A/\mu s^{(Note3)}$		40		nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Note:

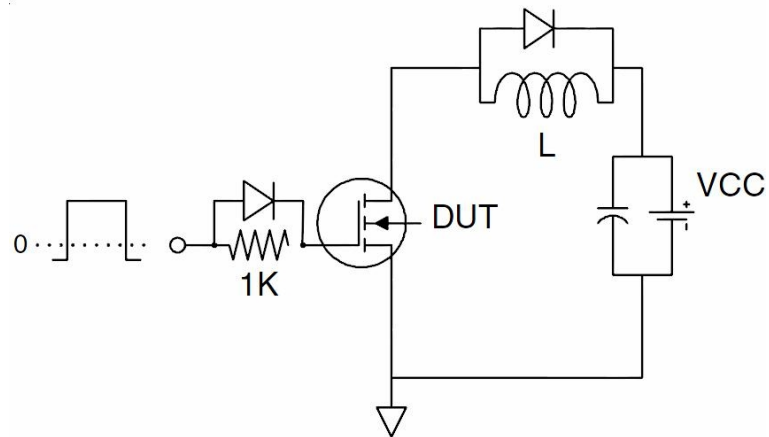
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. EAS condition : $T_J = 25^{\circ}\text{C}, V_{DD} = 30V, V_G = 10V, L = 0.5mH, R_G = 25\Omega$

Test Circuits

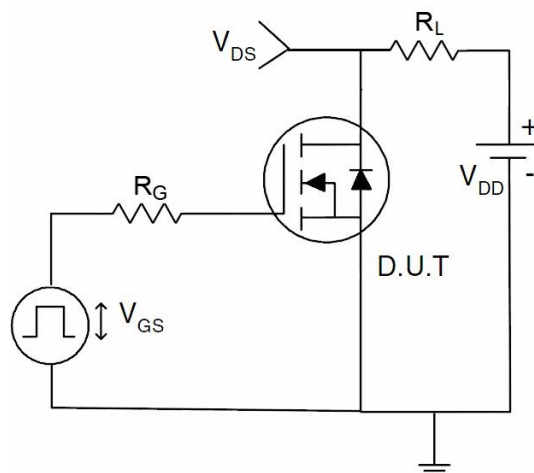
- EAS Test Circuits



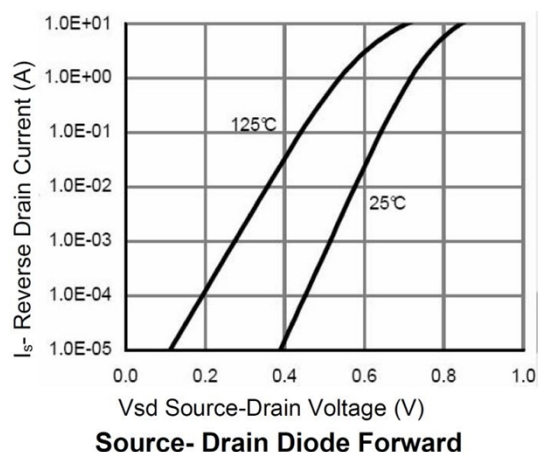
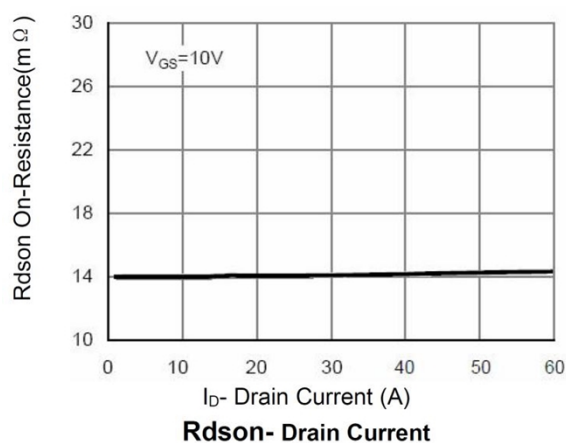
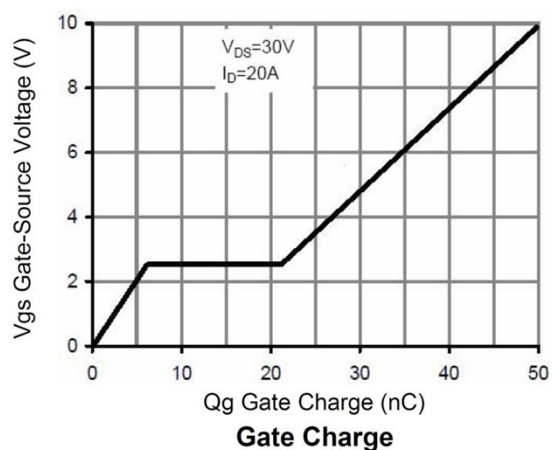
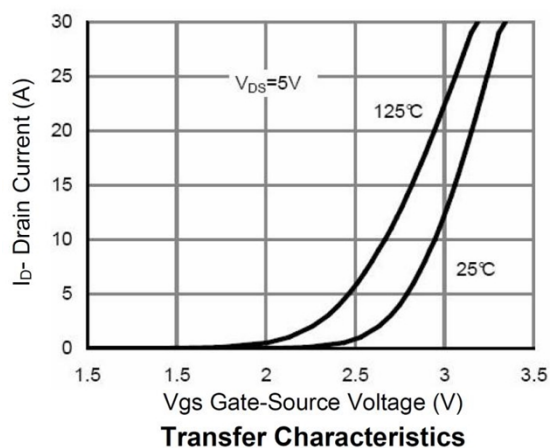
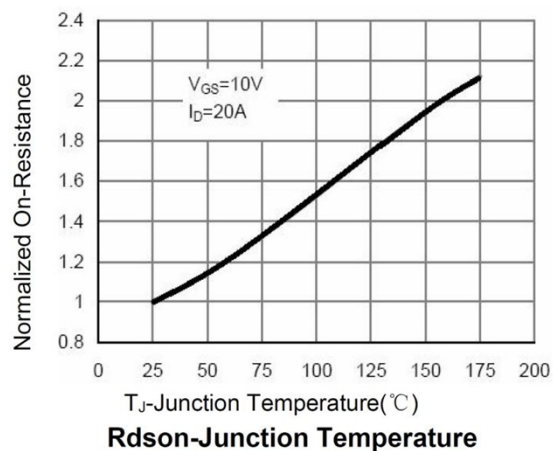
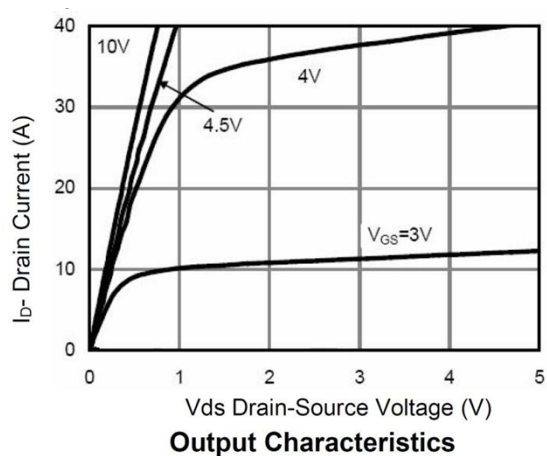
- Gate Charge Test Circuit

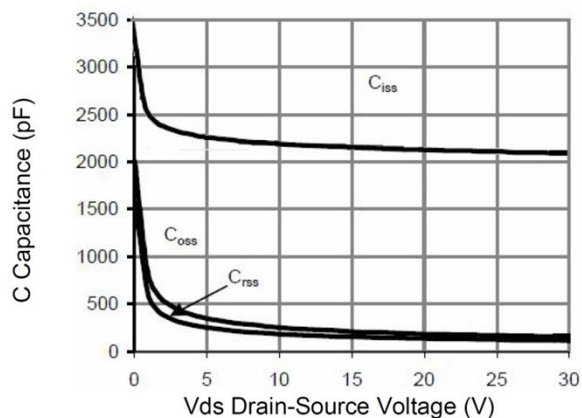


- Switch Time Test Circuit

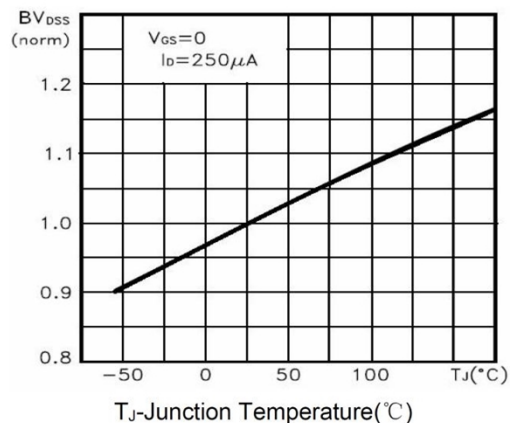


Typical Characteristics

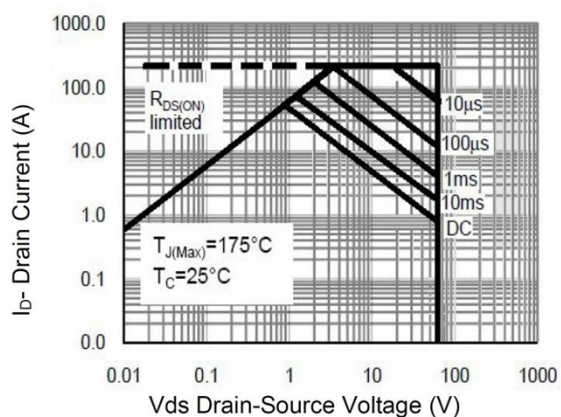




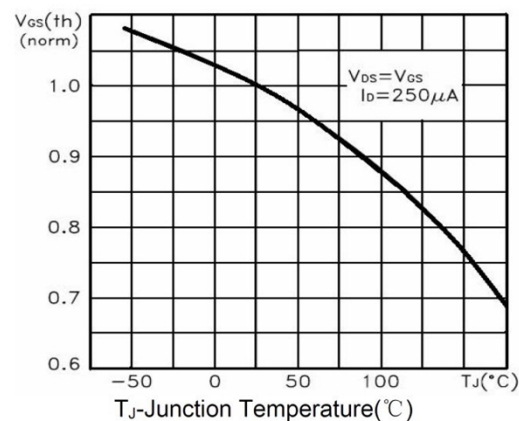
Capacitance vs Vds



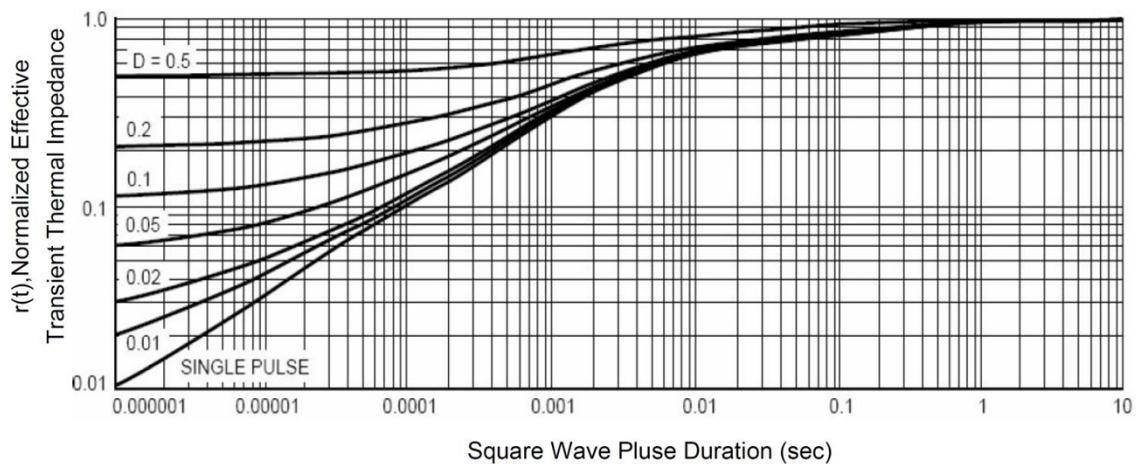
BV_{DSS} vs Junction Temperature



Safe Operation Area

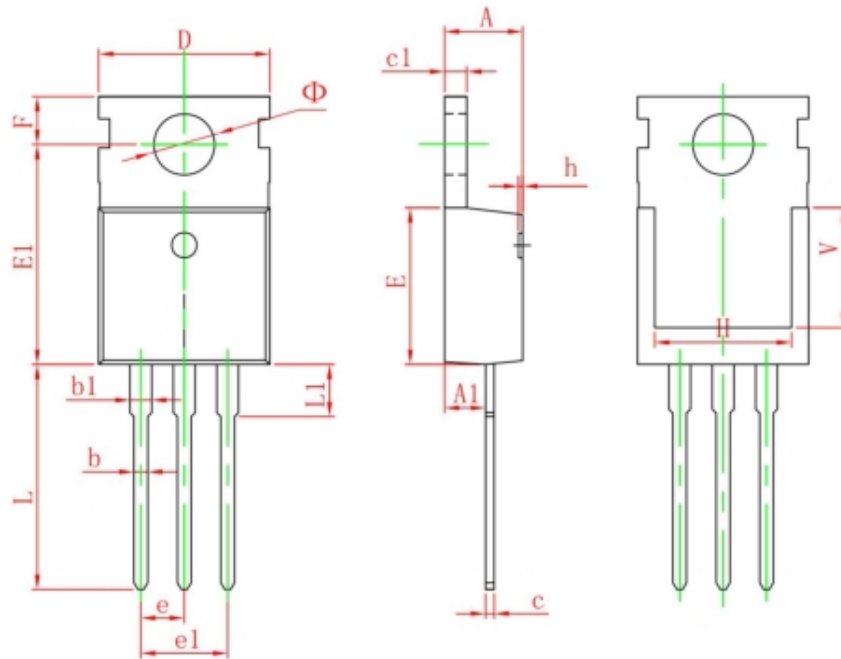


$V_{GS(th)}$ vs Junction Temperature



Normalized Maximum Transient Thermal Impedance

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