

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
60V	23mΩ@10V	25A

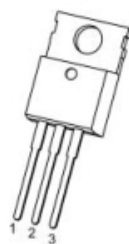
Feature

- 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

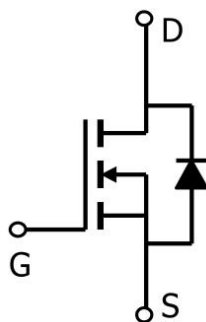
- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

Package

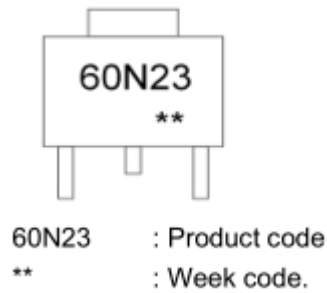


TO-220-3L-C(G:1 D:2 S:3)

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	I _D	25	A
Pulsed Drain Current	I _{DM}	100	A
Maximum Power Dissipation	P _D	45	W
Single pulse avalanche energy ⁽¹⁾	E _{AS}	72	mJ
Thermal Resistance,Junction-to-Case ⁽²⁾	R _{θJC}	3.3	°C/W
Operating Junction and Storage Temperature Range	T _{STG.} , T _J	-55 To 175	°C

Electrical characteristics

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

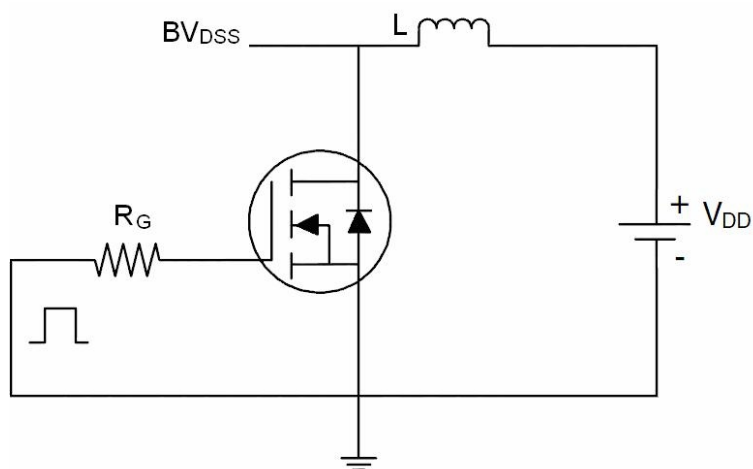
Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV (BR)DSS	V _{GS} = 0V, I _D =250μA	60			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =60V, V _{GS} = 0V			1	uA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} = 0V			±100	uA
On Characteristics ⁽³⁾						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1	1.6	2.5	V
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} =10V, I _D =20A		23	29	mΩ
		V _{GS} =4.5V, I _D =15A		30	40	
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =5A	11			S
Dynamic Characteristics ⁽⁴⁾						
Input capacitance	C _{iss}	V _{DS} =15V, V _{GS} =0V, f=1MHz		1304		pF
Output capacitance	C _{Oss}			123		
Reverse transfer capacitance	C _{rss}			97		
Switching Characteristics ⁽⁴⁾						
Turn-on Delay Time	T _{d(on)}	V _{DD} =30V, I _D =2A, V _{GS} =10V, R _G =3Ω		6		nS
Turn-on Rise Time	T _r			6.1		
Turn-Off Delay Time	T _{d(off)}			17		
Turn-Off Fall Time	t _f			3		
Total Gate Charge	Q _g	V _{DS} =30V , I _D =10A , V _{GS} =10V,		25.3		pF
Gate-Source Charge	Q _{gs}			4.7		
Gate-Drain Charge	Q _{gd}			6.1		
Drain-Source Body Diode Characteristics						
Diode Forward Voltage ⁽³⁾	V _{SD}	V _{GS} =0V ,I _S =20A			1.2	V
Diode Forward Current ⁽²⁾	I _S				20	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F =20A		29.5		nS
Reverse Recovery Charge	Q _{rr}	di/dt = 100A/μs ⁽³⁾		50		nC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Note:

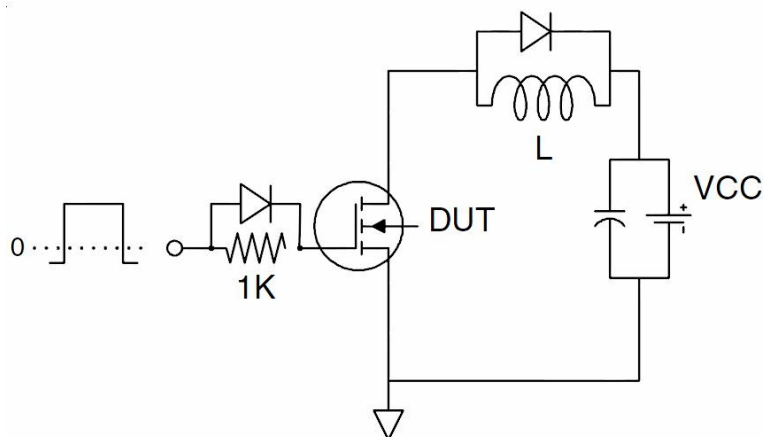
1. E_{AS} condition: $T_J = 25^{\circ}\text{C}, V_{DD} = 30V, V_G = 10V, L = 0.5mH, R_G = 25\Omega$.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

Test Circuits

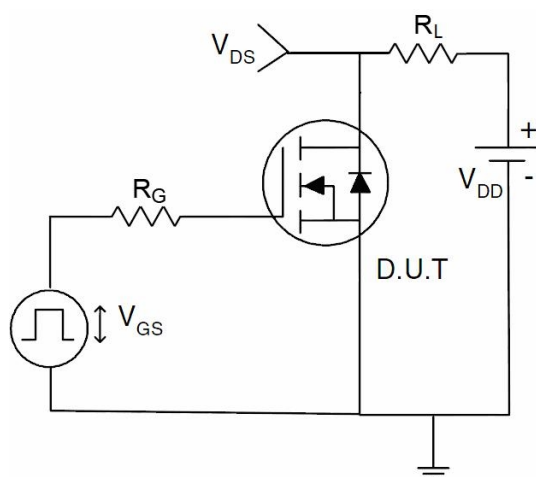
- EAS Test Circuits



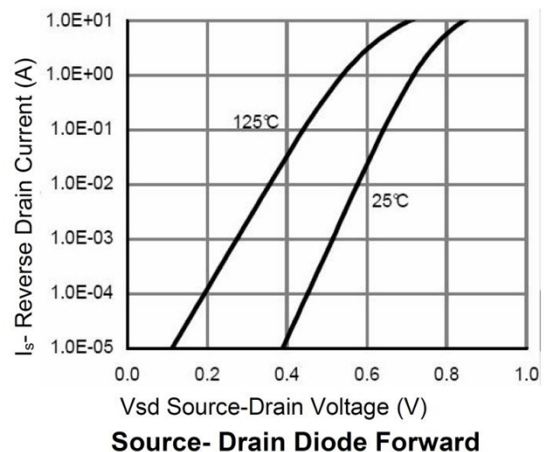
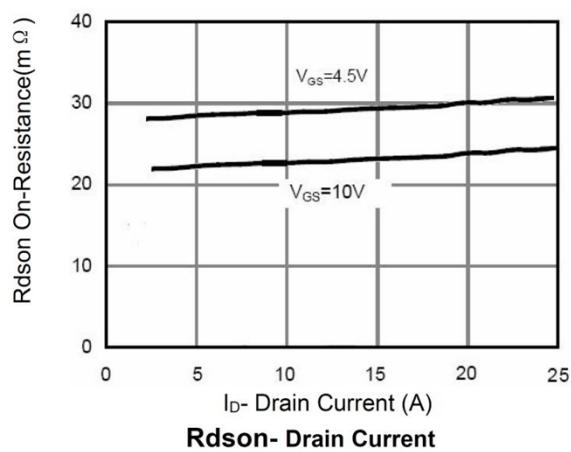
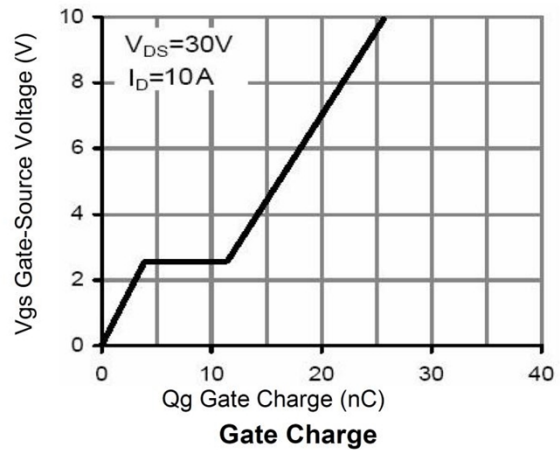
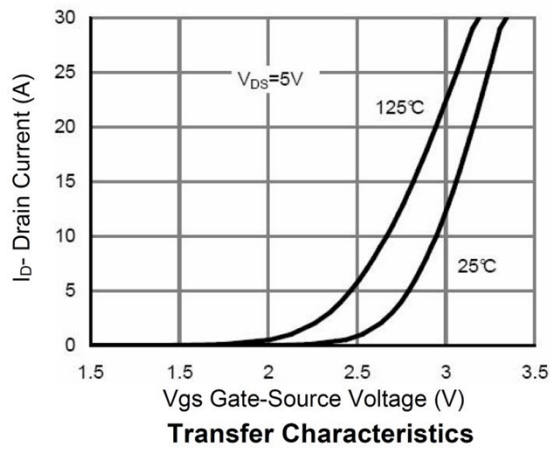
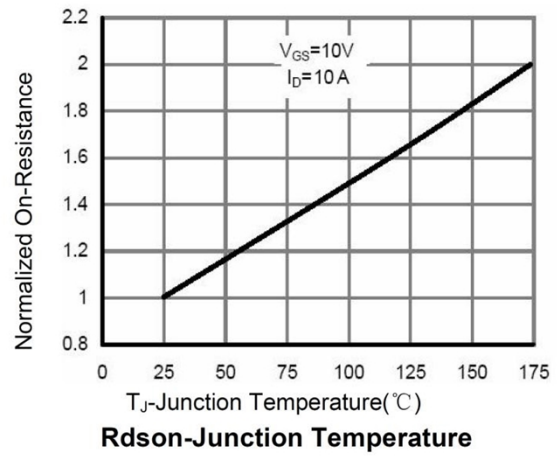
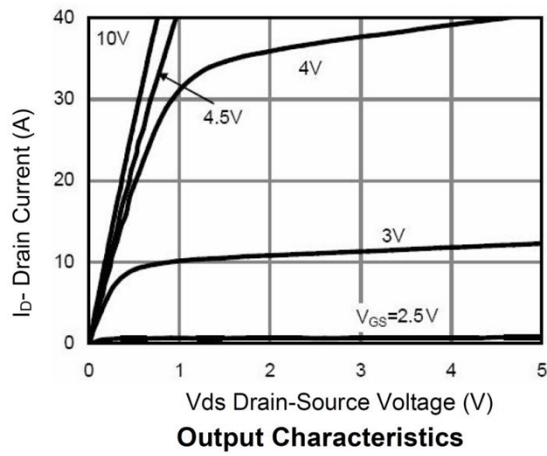
- Gate Charge Test Circuit

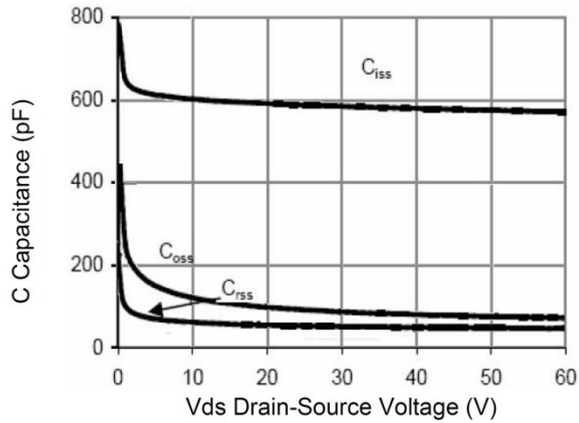


- Switch Time Test Circuit

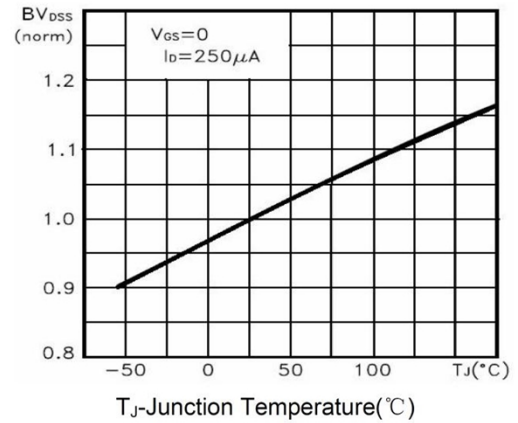


Typical Characteristics

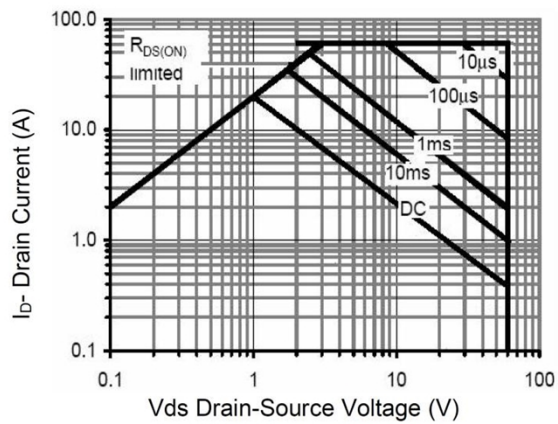




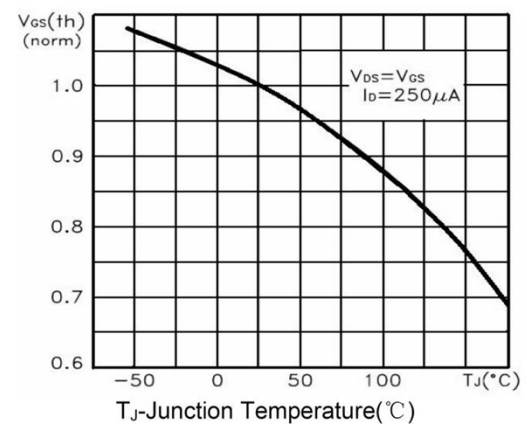
Capacitance vs Vds



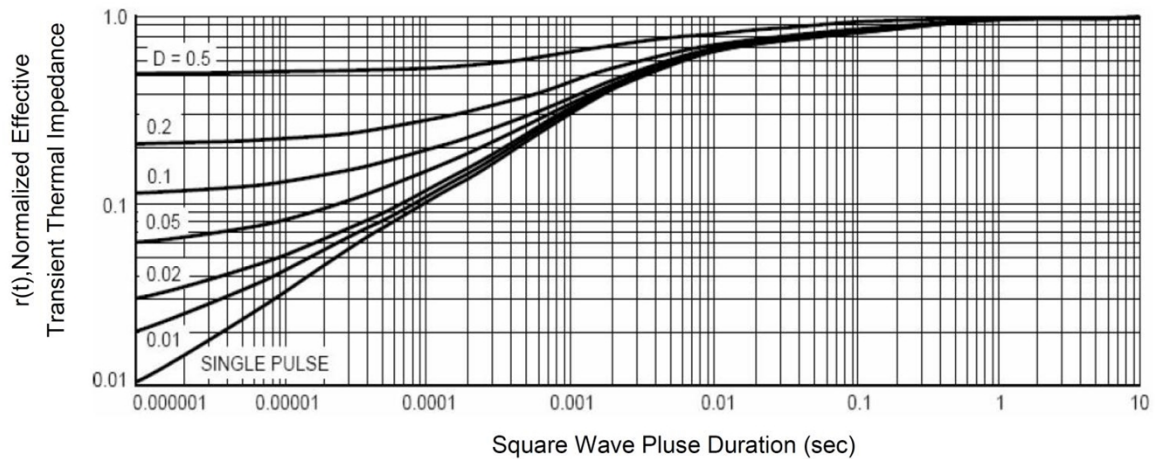
BV_{DSS} vs Junction Temperature



Safe Operation Area

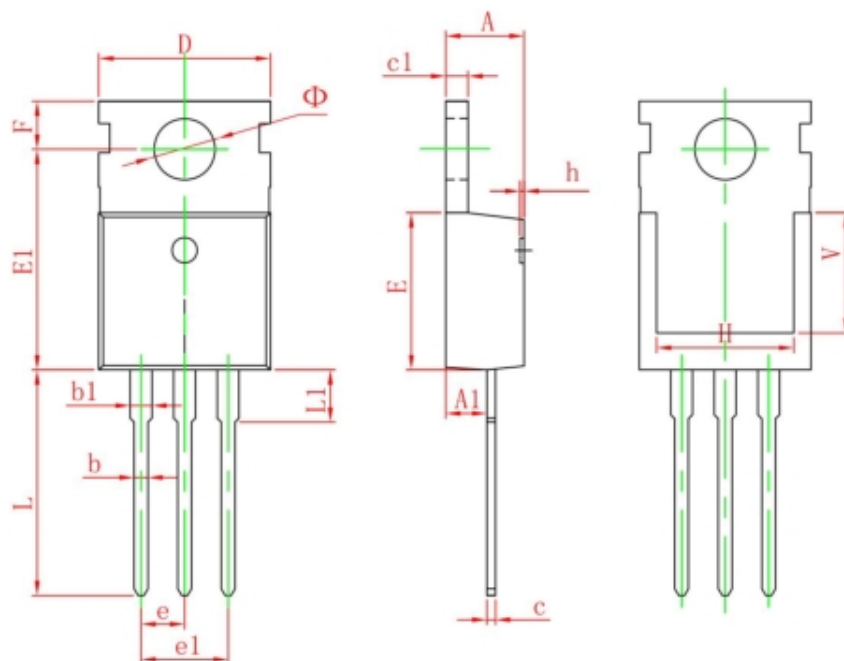


$V_{GS(th)}$ vs Junction Temperature



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