

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
-60V	23mΩ@-10V	-40A

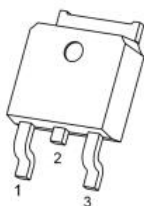
Feature

- $V_{DS} = -60V, I_D = -40A$
- $R_{DS(on)} < 28m\Omega @ V_{GS} = -10V$
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation

Application

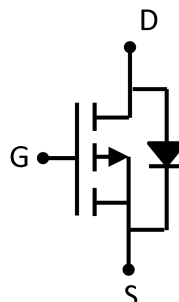
- Load switch

Package

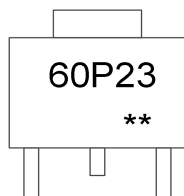


TO-252-2L(G:1 D:2 S:3)

Circuit diagram



Marking



60P23 : Product code
** : Week code.

**Absolute maximum ratings (Ta=25°C unless otherwise noted)**

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous ¹	I_D	-40	A
Drain Current-Continuous(100°C)	$I_{D(100^\circ C)}$	-34	A
Pulsed Drain Current ²	I_{DM}	-90	A
Single pulse avalanche energy	E_{AS}	101	mJ
Maximum Power Dissipation ⁴	P_D	86.8	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	°C

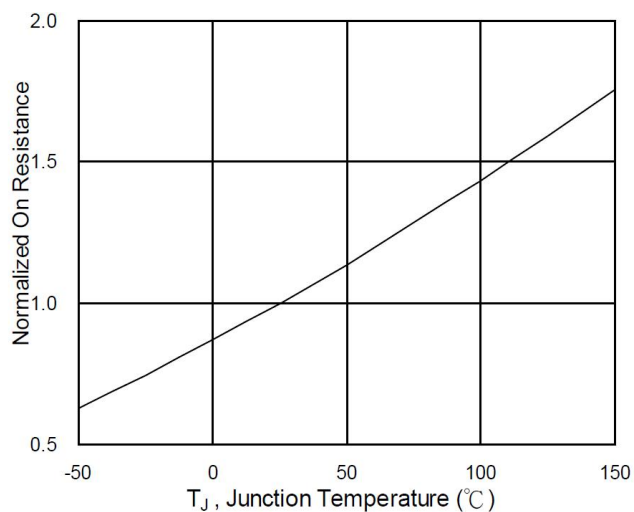
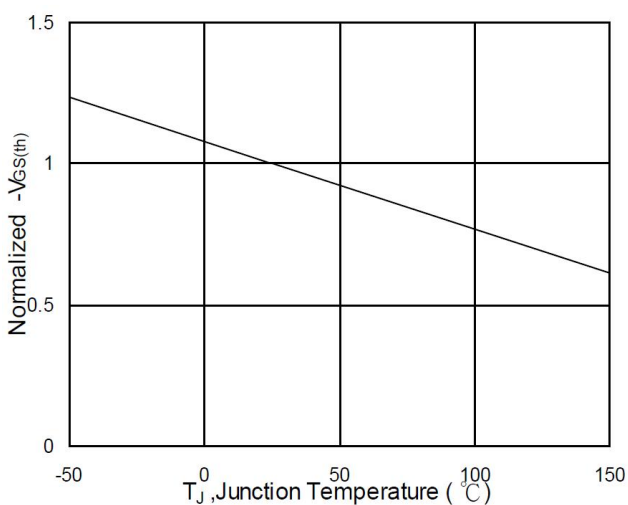
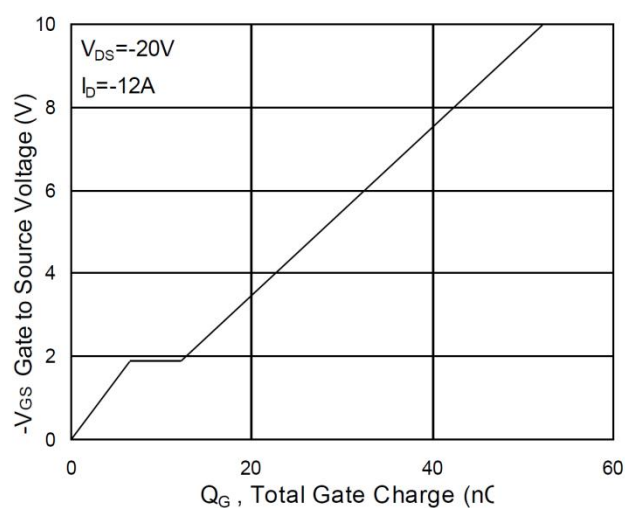
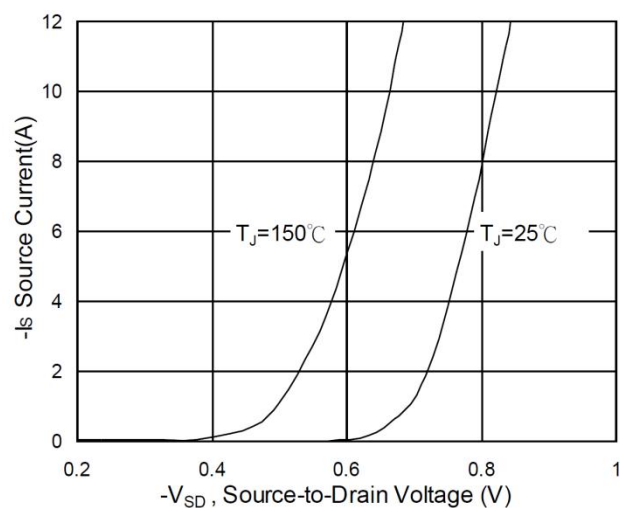
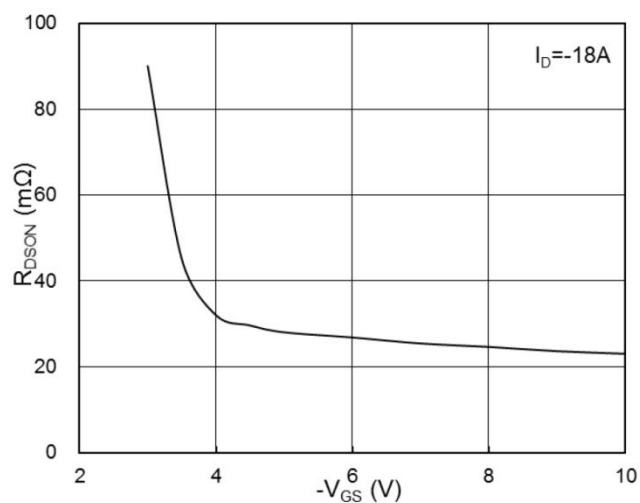
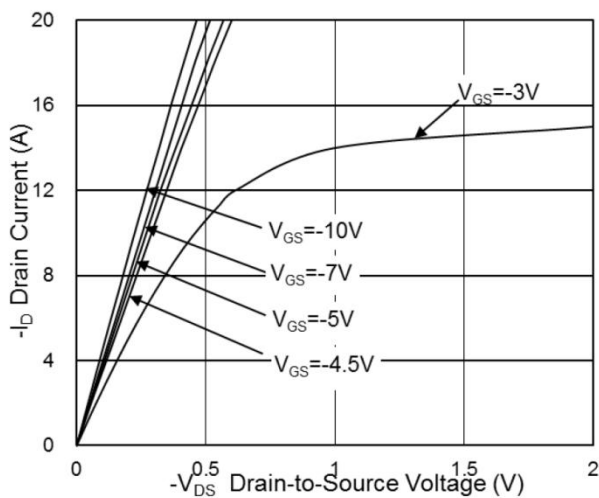
Electrical characteristics (Ta=25 °C, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	VGS=0V , ID=-250uA	-60	---	---	V
Drain-Source Leakage Current	I _{DSS}	VDS=-48V , VGS=0V , TJ=25℃	---	---	1	uA
Gate-Source Leakage Current	I _{GSS}	VGS=±20V , VDS=0V	---	---	±100	nA
Gate Threshold Voltage	V _{GS(th)}	VGS=VDS , ID =-250uA	-1	---	-2.5	V
Static Drain-Source On-Resistance ²	R _{DS(ON)}	VGS=-10V , ID=-18A	---	23	28	mΩ
		VGS=-4.5V , ID=-12A	---	29	35	
Switching Characteristics						
Total Gate Charge (-4.5V)	Q _g	VDS=-20V , VGS=-4.5V , ID=-12A	---	25	---	nC
Gate-Source Charge	Q _{gs}		---	6.7	---	
Gate-Drain Charge	Q _{gd}		---	5.5	---	
Turn-On Delay Time	t _{d(on)}	VDD=-15V , VGS=-10V , RG=3.3W, ID=-1A	---	38	---	ns
Rise Time	t _r		---	23.6	---	
Turn-Off Delay Time	t _{d(off)}		---	100	---	
Fall Time	t _f		---	6.8	---	
Dynamic Characteristics						
Input Capacitance	C _{iss}	VDS=-15V , VGS=0V , f=1MHz	---	3635	---	pF
Output Capacitance	C _{oss}		---	224	---	
Reverse Transfer Capacitance	C _{rss}		---	141	---	
Drain-Source Diode Characteristics						
Continuous Source Current ^{1,5}	I _S	VG=VD=0V , Force Current	---	---	-40	A
Diode Forward Voltage ²	V _{SD}	VGS=0V , IS=-1A , TJ=25℃	---	---	-1	V

Notes:

- The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- The EAS data shows Max. rating . The test condition is $V_{DD}=-25V, V_{GS}=-10V, L=0.1mH, I_{AS}=-45A$
- The power dissipation is limited by 150°C junction temperature
- The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation

Typical Characteristics



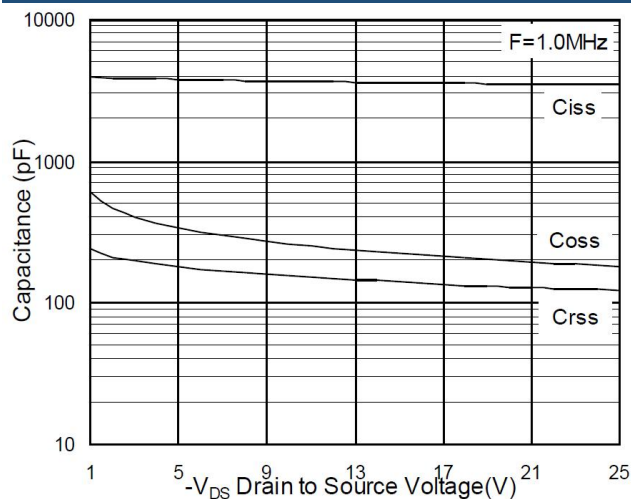


Fig.7 Capacitance

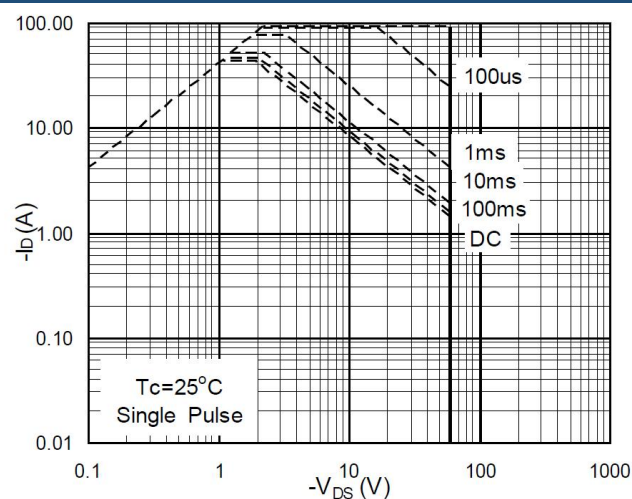


Fig.8 Safe Operating Area

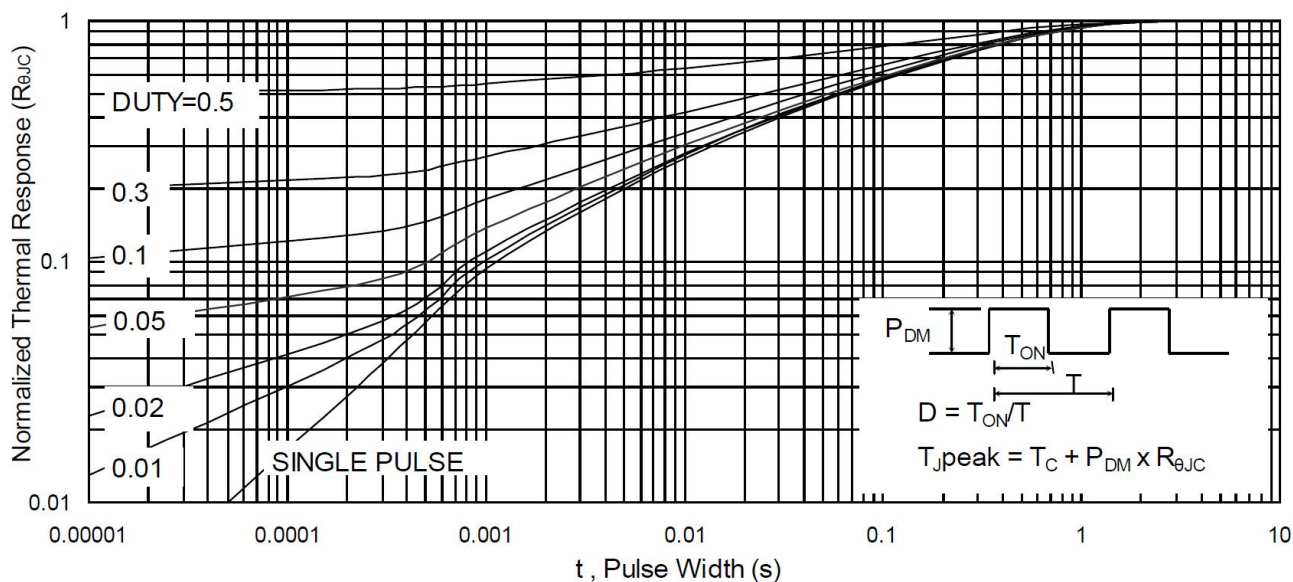


Fig.9 Normalized Maximum Transient Thermal Impedance

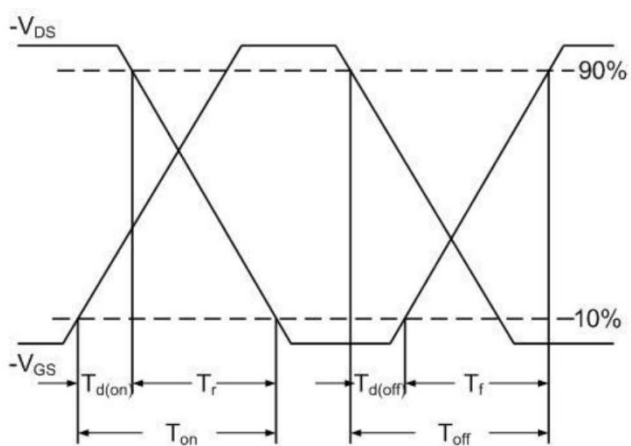


Fig.10 Switching Time Waveform

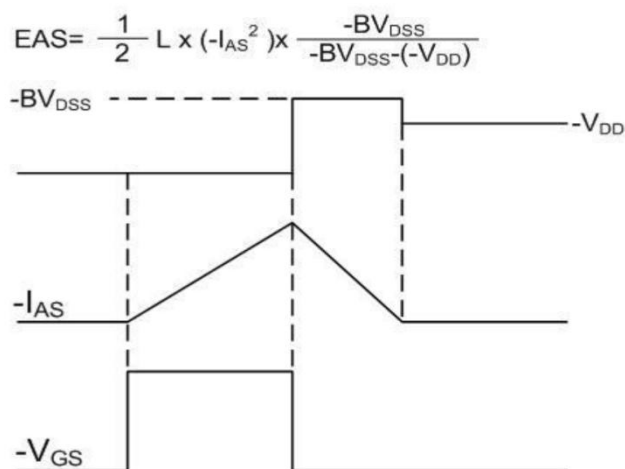
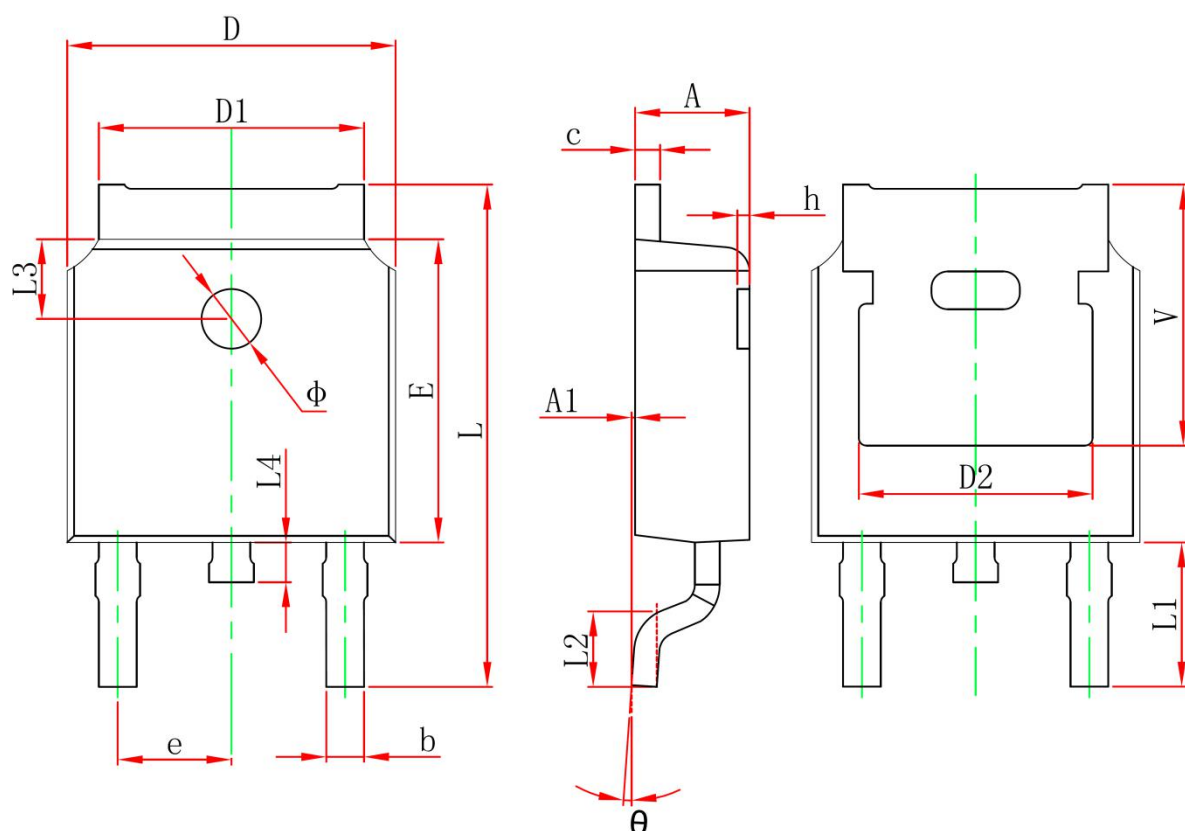


Fig.11 Unclamped Inductive Waveform

TO-252 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 REF.		0.211 REF.	