

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
-40V	4.8mΩ@-10V	-90A
	6.5mΩ@-4.5V	



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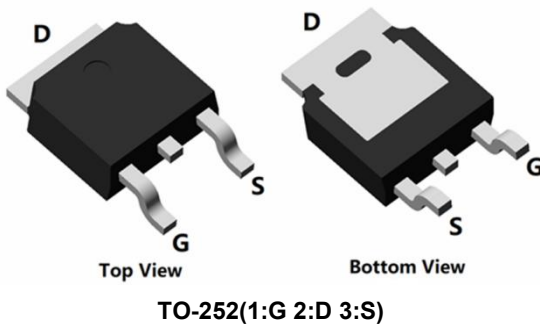
Feature

- Fast Switching
- Low Gate Charge and Rdson
- 100% Single Pulse avalanche energy Test

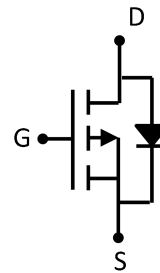
Applications

- DC-DC Converter
- Power Switching Application

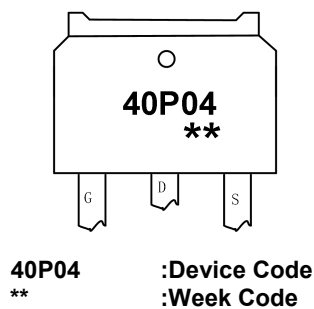
Package



Circuit diagram



Marking



Order Information

Device	Package	Unit/Tape
SP40P04TH	TO-252	2500

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

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($T_C=25^\circ\text{C}$)	I_D	-90	A
Continuous Drain Current ($T_C=100^\circ\text{C}$)	I_D	-60	A
Pulsed Drain Current	I_{DM}	-360	A
Single Pulse Avalanche Energy ¹	E_{AS}	506	mJ
Power Dissipation ($T_C=25^\circ\text{C}$)	P_D	130	W
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	0.96	$^\circ\text{C/W}$
Storage Temperature Range	T_{STG}	-55 to 150	$^\circ\text{C}$
Operating Junction Temperature Range	T_J	-55 to 150	$^\circ\text{C}$

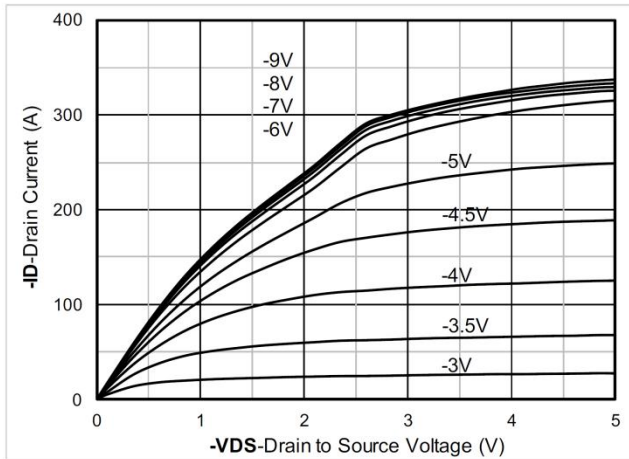
Electrical characteristics (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	VGS=0V , ID=250uA	-40	-	-	V
Drain-Source Leakage Current	IDSS	VDS=-32V , VGS=0V , TJ=25℃	-	-	-1	uA
Gate-Source Leakage Current	IGSS	VGS=±20V , VDS=0V	-	-	±100	nA
Gate Threshold Voltage	VGS(th)	VGS=VDS , ID =250uA	-1.0	-1.7	-2.5	V
Static Drain-Source On-Resistance	RDS(ON)	VGS= -10V , ID= -20A	---	4.8	6	mΩ
		VGS= -4.5V , ID=-20A	---	6.5	8.6	
Dynamic characteristics						
Input Capacitance	Ciss	VDS=-20V , VGS=0V , f=1MHz	-	6456	-	pF
Output Capacitance	Coss		-	508	-	
Reverse Transfer Capacitance	Crss		-	441	-	
Total Gate Charge	Qg	VDS=-20V , VGS=-10V , ID=-20A	-	74	-	nC
Gate-Source Charge	Qgs		-	22	-	
Gate-Drain Charge	Qgd		-	18	-	
Switching Characteristics						
Turn-On Delay Time	Td(on)	VDD= -20V, ID= -20A , VGS= -10V , RG=2.4Ω	-	10	-	nS
Rise Time	Tr		-	15	-	
Turn-Off Delay Time	Td(off)		-	93	-	
Fall Time	Tf		-	20	-	
Diode Characteristics						
Diode Forward Voltage	VSD	VGS=0V , IS=-1A , TJ=25℃	-	-	-1.2	V
Maximum Body-Diode Continuous Current	IS		-	-	-90	A
Reverse Recovery Time	Trr	IS=-15A, di/dt=100A/us, TJ=25℃	-	20	-	nS
Reverse Recovery Charge	Qrr		-	11	-	nC

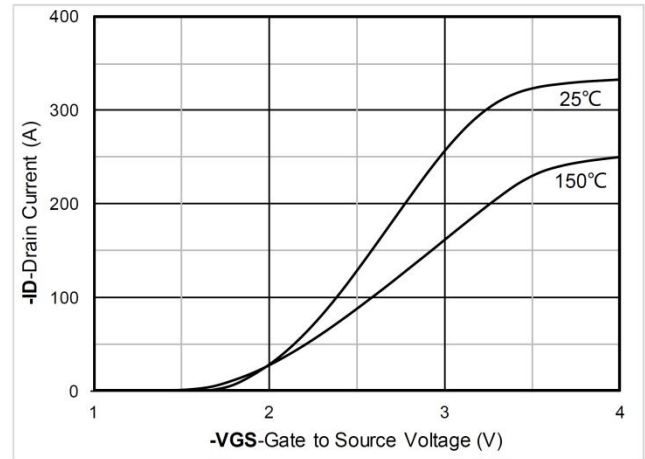
Note :

- The EAS test condition is $V_{DD}=-25V, V_{GS}=-10V, L=0.5mH, R_G=25\Omega$

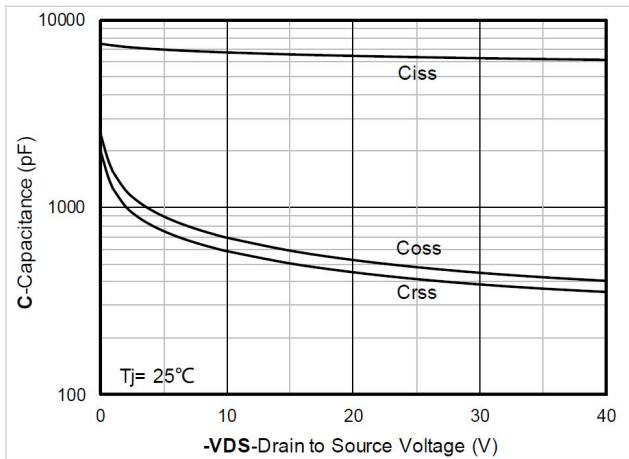
Typical Characteristics



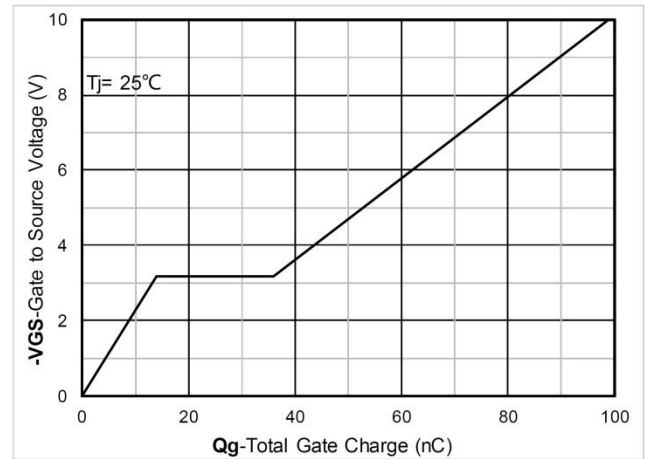
Output Characteristics



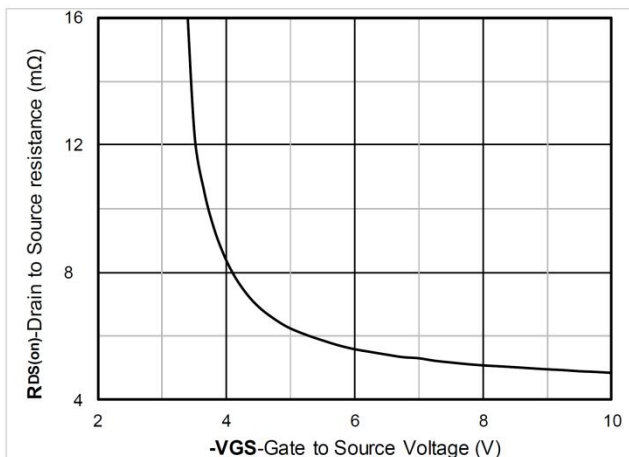
Transfer Characteristics



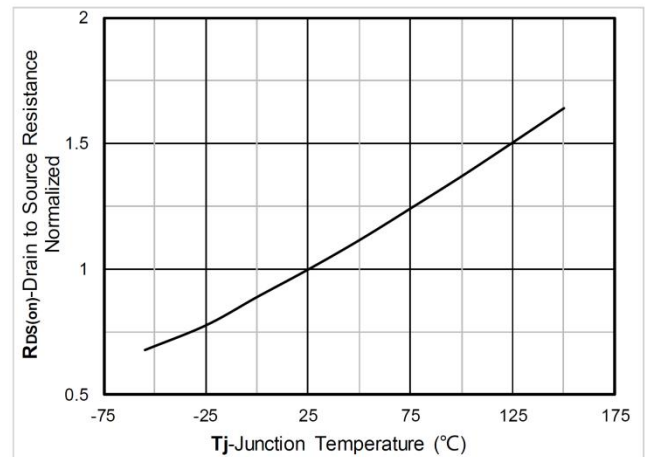
Capacitance Characteristics



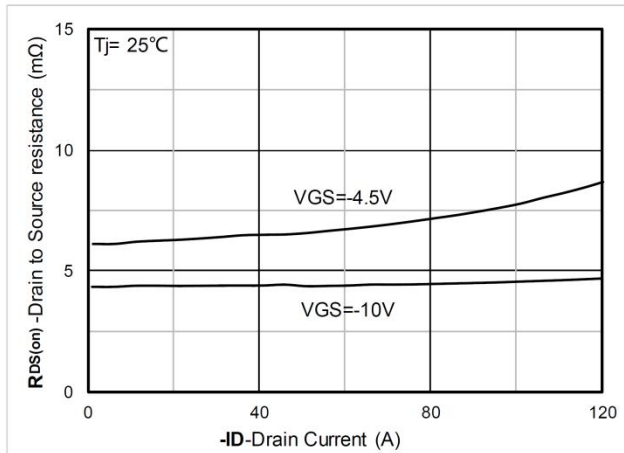
Gate Charge



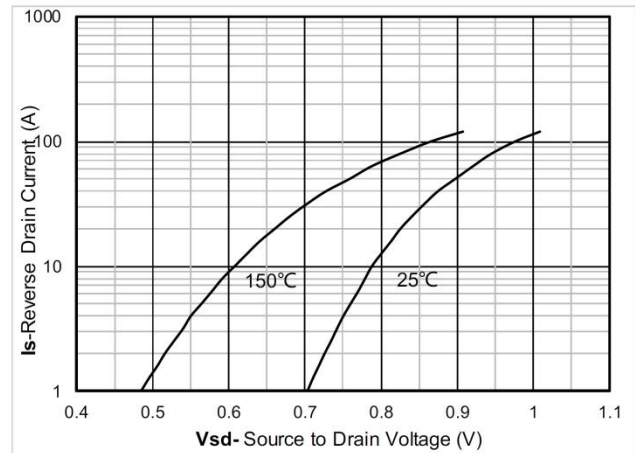
On-Resistance vs Gate to Source Voltage



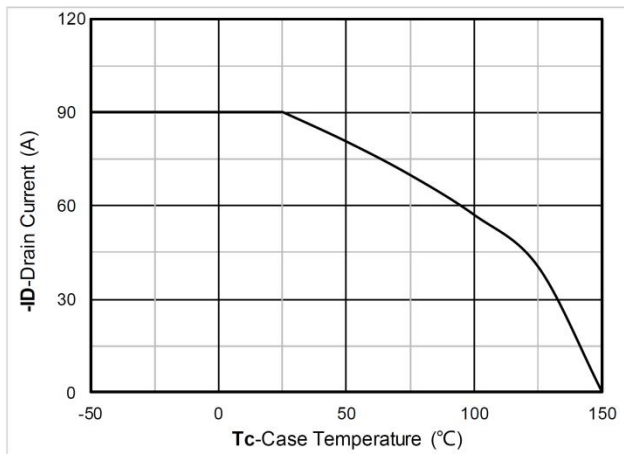
Normalized On-Resistance



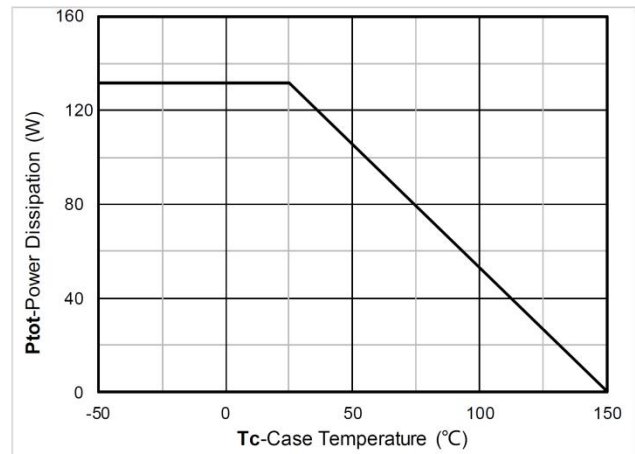
$R_{DS(on)}$ VS Drain Current



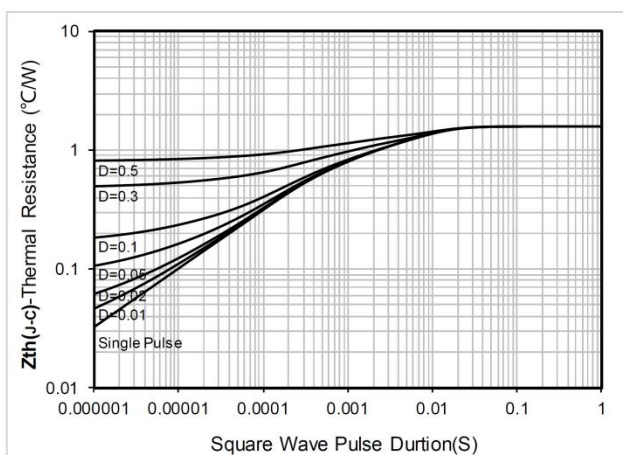
Forward characteristics of reverse diode



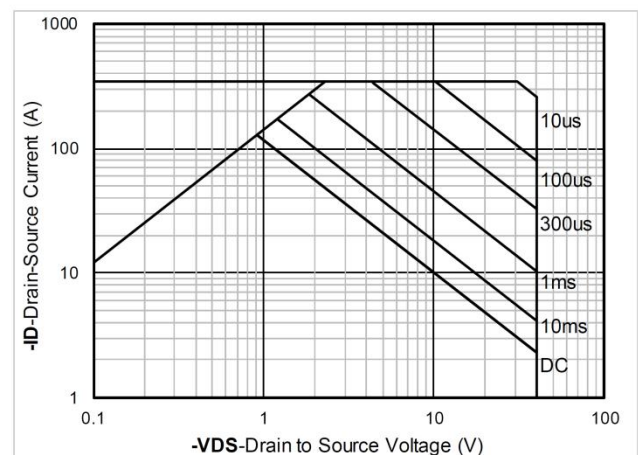
Current dissipation



Power dissipation

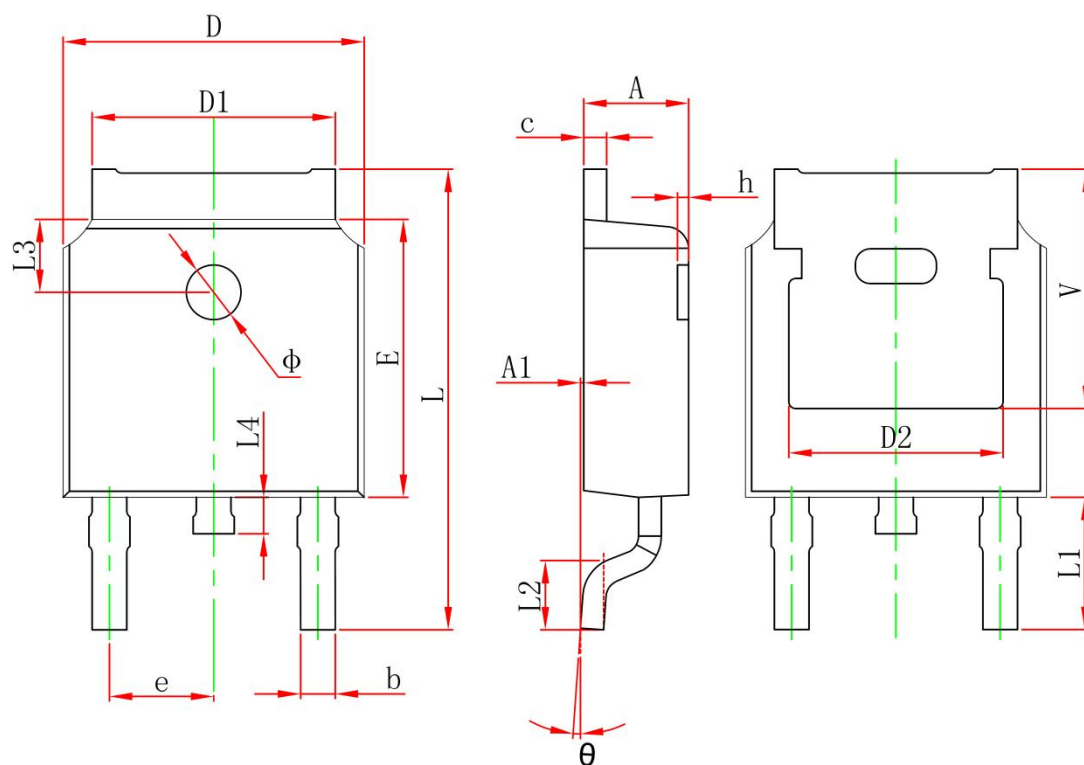


Maximum Transient Thermal Impedance



Safe Operation Area

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.	

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