

## P-Channel Enhancement Mode MOSFET

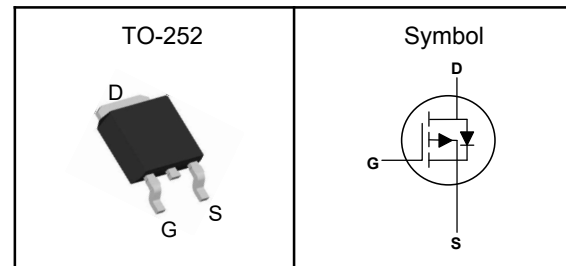
### Features

- Low  $R_{ds(on)}$  for low conduction loss
- Reliable and Rugged
- ROHS Compliant & Halogen-Free

### Applications

- Power Management in Desktop Computer
- DC/DC Converters

### Pin Description



$V_{bss}$	-60	V
$R_{ds(ON)-Typ}$	8	m $\Omega$
$I_D$	-70	A

### Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ , Unless Otherwise Noted)

Symbol	Parameter	P-Channel	Unit
$V_{bss}$	Drain-Source Voltage	-60	V
$V_{gss}$	Gate-Source Voltage	$\pm 20$	V
$T_J$	Maximum Junction Temperature	-55 to 150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$I_{DM}^{①}$	Pulse Drain Current Tested	$T_C=25^\circ\text{C}$	A
$I_D$	Continuous Drain Current	$T_C=25^\circ\text{C}$	A
$P_D$	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	W
EAS	Single Pulse Avalanche Energy	$L=0.1\text{mH}$	mJ

### Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}^{③}$	Thermal Resistance-Junction to Ambient Steady State	62	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case Steady State	0.94	$^\circ\text{C/W}$

Note ① : Max. current is limited by bonding wire.

Note ② : UIS tested and pulse width are limited by maximum junction temperature  $150^\circ\text{C}$ .

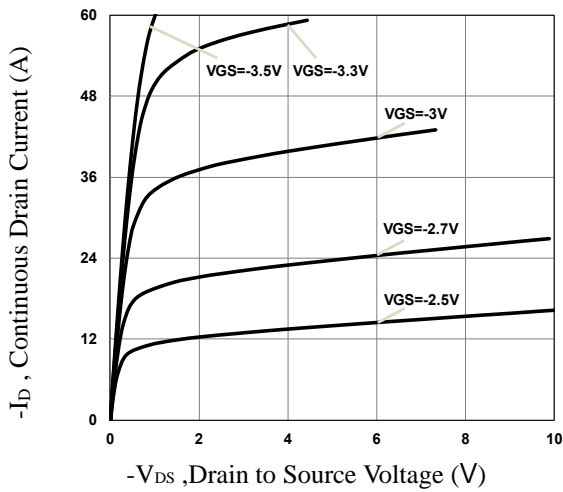
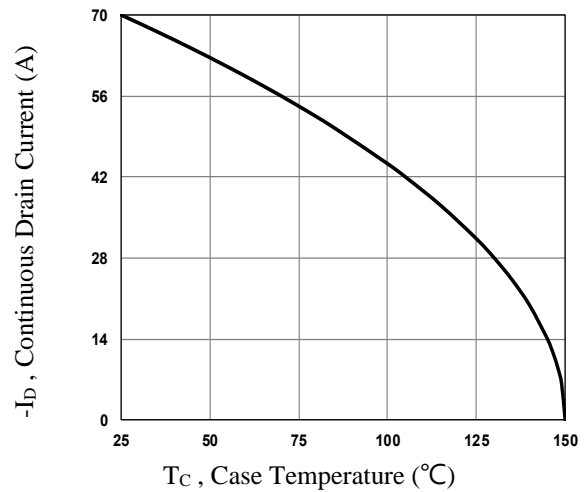
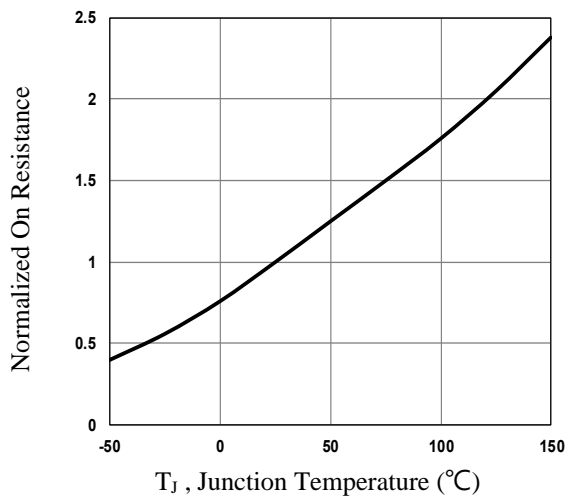
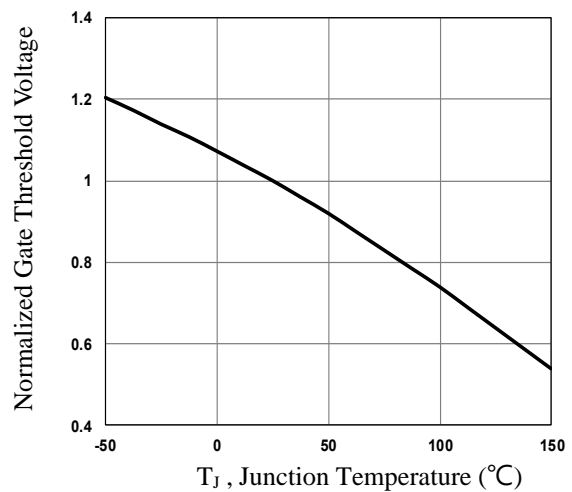
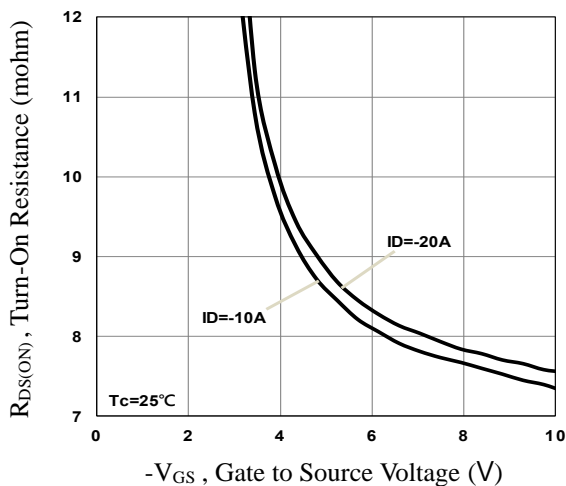
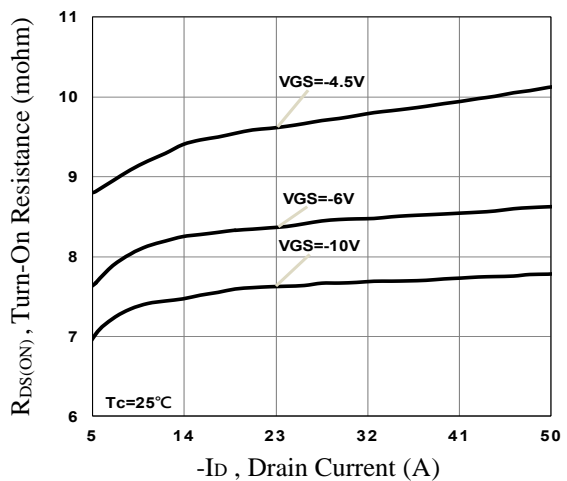
Note ③ : Surface Mounted on  $1\text{in}^2$  FR-4 board with 1oz.

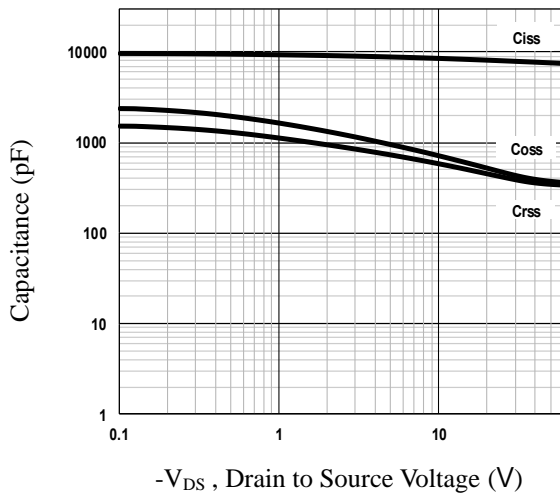
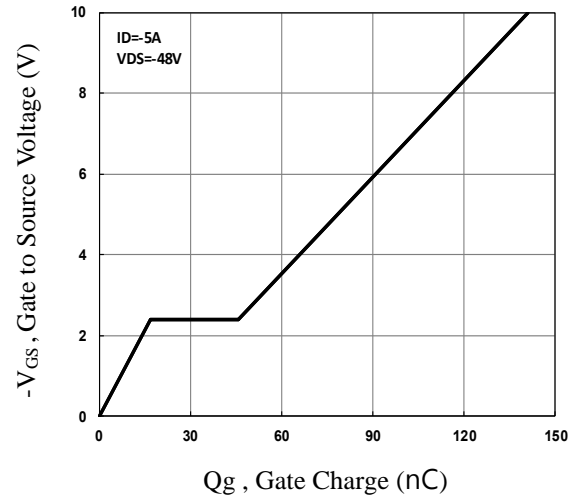
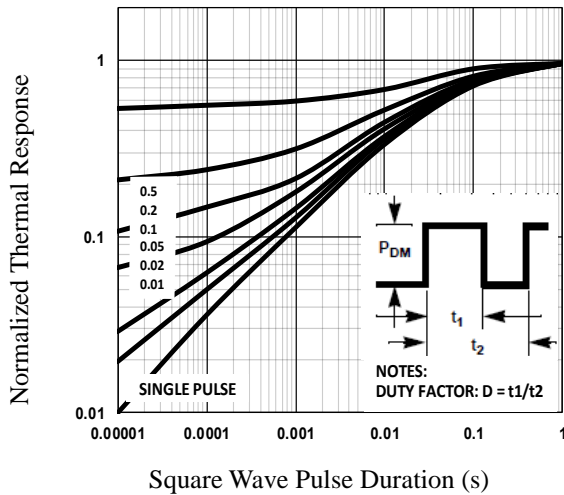
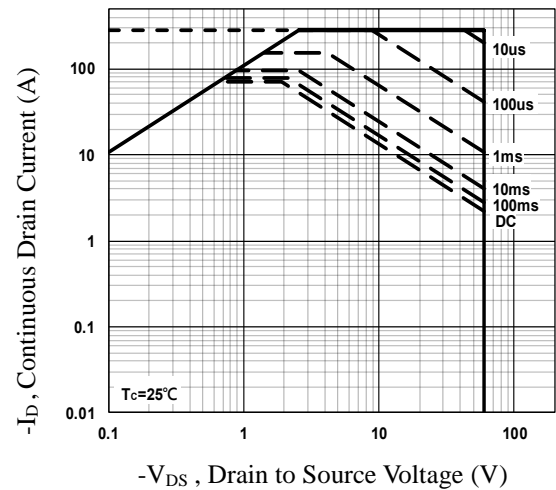
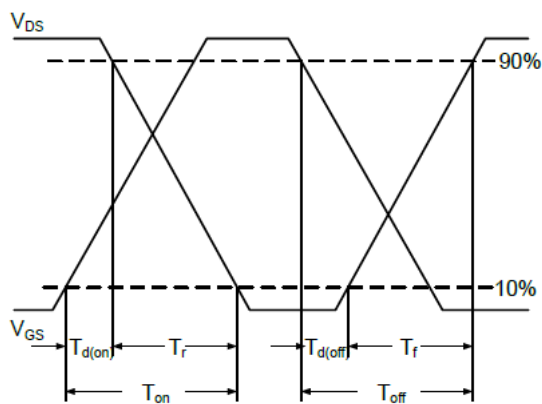
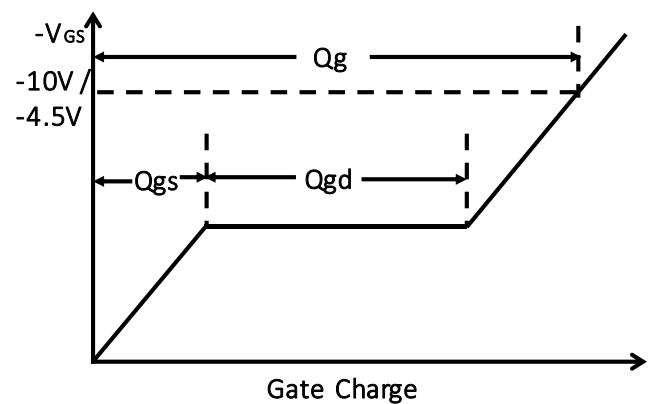
**P-Channel Enhancement Mode MOSFET****Electrical Characteristics** ( $T_J=25^\circ\text{C}$ , Unless Otherwise Noted)

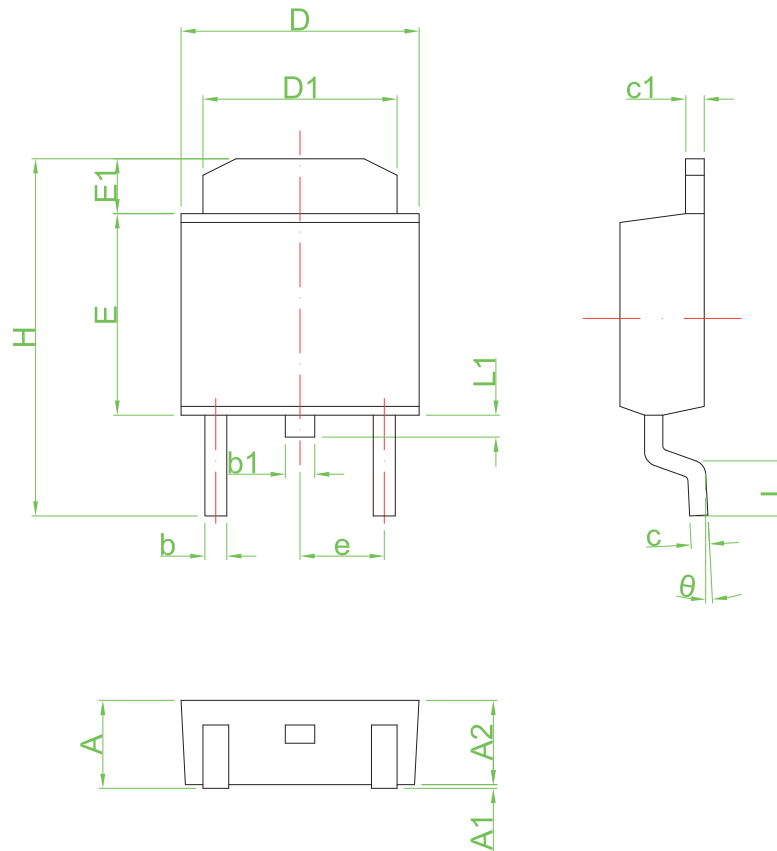
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
<b>Static Electrical Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-60	---	---	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=-60V, V_{GS}=0V$	---	---	-1	$\mu A$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.1	---	-2.5	V
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 25V, V_{DS}=0V$	---	---	$\pm 100$	nA
$R_{DS(on)}$	Drain-Source On-state Resistance	$V_{GS}=-10V, I_D=-20A$	---	8	10	$m\Omega$
		$V_{GS}=-4.5V, I_D=-10A$	---	11	14	$m\Omega$
<b>Dynamic Characteristics<sup>⑤</sup></b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=-25V,$ Freq.=1MHz	---	8560	---	pF
$C_{oss}$	Output Capacitance		---	480	---	
$C_{rss}$	Reverse Transfer Capacitance		---	425	---	
$T_{d(on)}$	Turn-on Delay Time	$V_{DD}=-48V,$ $V_{GS}=-10V, R_G=6\Omega,$ $I_D=-1A,$	---	70	---	nS
$T_r$	Turn-on Rise Time		---	205	---	
$T_{d(off)}$	Turn-off Delay Time		---	400	---	
$T_f$	Turn-off Fall Time		---	190	---	
$Q_g$	Total Gate Charge	$V_{DS}=-48V,$ $V_{GS}=-10V, I_D=-5A$	---	140	---	nC
$Q_{gs}$	Gate-Source Charge		---	17	---	
$Q_{gd}$	Gate-Drain Charge		---	28	---	
<b>Source-Drain Characteristics (<math>T_J=25^\circ\text{C}</math>)</b>						
$V_{SD}^{④}$	Diode Forward Voltage	$V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$	---	-0.8	-1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F=-10A,$ $di/dt=100A/\mu s, T_J=25^\circ\text{C}$	---	60	---	nS
$Q_{rr}$	Reverse Recovery Charge		---	60	---	nC

Note ④: Pulse test (pulse width 300us, duty cycle 2%).

Note ⑤: Guaranteed by design, not subject to production testing.

**P-Channel Enhancement Mode MOSFET**
**Typical Characteristics**

**Fig.1 Typical Output Characteristics**

**Fig.2 Continuous Drain Current vs. T<sub>c</sub>**

**Fig.3 Normalized R<sub>DS(on)</sub> vs. T<sub>J</sub>**

**Fig.4 Normalized V<sub>th</sub> vs. T<sub>J</sub>**

**Fig.5 Turn-On Resistance vs. V<sub>GS</sub>**

**Fig.6 Turn-On Resistance vs. I<sub>D</sub>**

**P-Channel Enhancement Mode MOSFET**

**Fig.7 Capacitance Characteristics**

**Fig.8 Gate Charge Characteristics**

**Fig.9 Normalized Transient Impedance**

**Fig.10 Maximum Safe Operation Area**

**Fig.11 Switching Time Waveform**

**Fig.12 Gate Charge Waveform**

**P-Channel Enhancement Mode MOSFET**
**TO-252 Package Outline Dimensions**


Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	2.25	2.65	0.089	0.104
A1	0.00	0.15	0.000	0.006
A2	2.20	2.40	0.087	0.094
b	0.50	0.70	0.020	0.028
b1	0.70	0.90	0.028	0.035
c	0.46	0.66	0.018	0.026
c1	0.46	0.66	0.018	0.026
D	6.30	6.70	0.248	0.264
D1	5.20	5.40	0.205	0.213
E	5.30	5.70	0.209	0.224
E1	1.40	1.60	0.055	0.063
H	9.40	9.90	0.370	0.390
e	2.30 TYP		0.09 TYP	
L	1.40	1.77	0.055	0.070
L1	0.50	0.70	0.020	0.028
theta	0°	8°	0°	8°