

P-Channel Enhancement Mode MOSFET

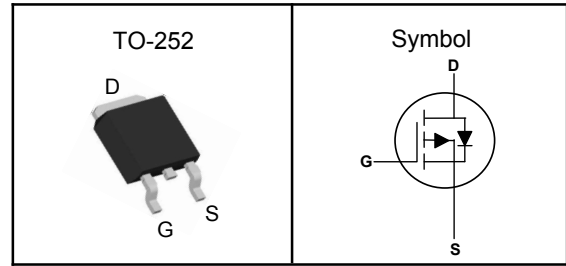
Features

- Advanced trench cell design
- Low Thermal Resistance
- ROHS Compliant & Halogen-Free
- 100% UIS and Rg Tested

Applications

- Motor drivers
- DC - DC Converter

Pin Description



V_{DSS}	-40	V
$R_{DS(ON)-Typ}$	11	m Ω
I_D	-48	A

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

Symbol	Parameter	Rating	Unit
V_{DSS}	Drain-Source Voltage	-40	V
V_{GSS}	Gate-Source Voltage	± 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	-160	A
I_D	Continuous Drain Current	$T_c=25^\circ\text{C}$	-48 A
P_D	Maximum Power Dissipation	$T_c=25^\circ\text{C}$	60 W
$I_{AS}^{②}$	Avalanche Current, Single pulse	L=0.1mH	-26 A
$E_{AS}^{②}$	Avalanche Energy, Single pulse	L=0.5mH	100 mJ

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}^{③}$	Thermal Resistance-Junction to Ambient	45	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance-Junction to Case	2.1	$^\circ\text{C/W}$

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

Note ② : UIS tested and pulse width are limited by maximum junction temperature 150°C .

Note ③ : Surface Mounted on 1in^2 FR-4 board with 1oz.



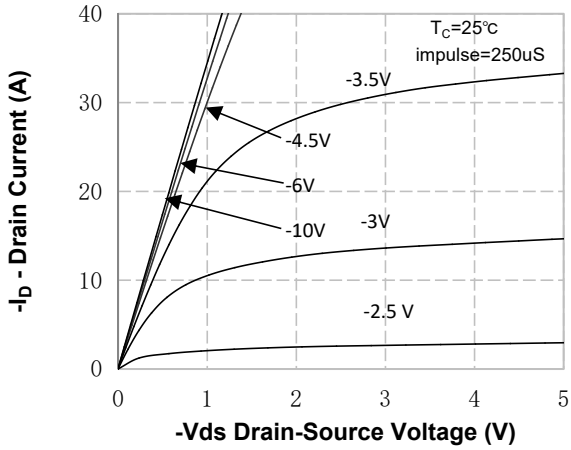
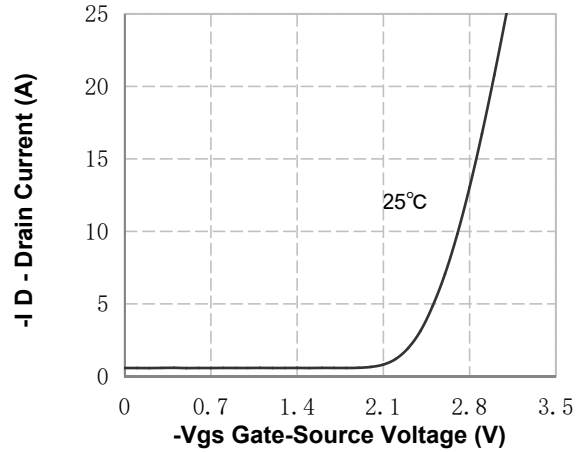
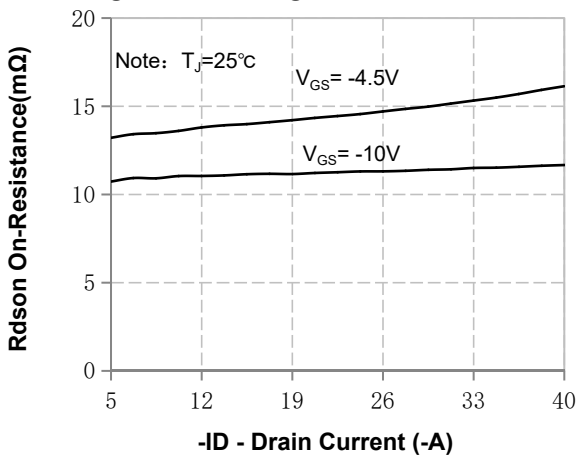
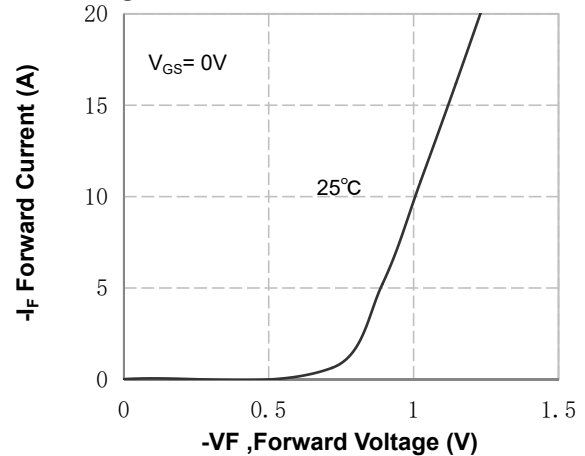
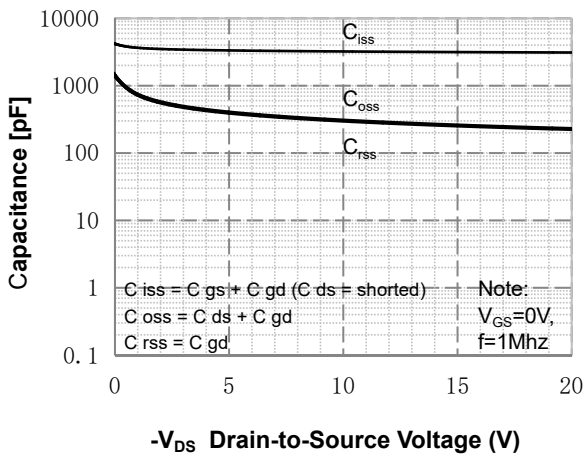
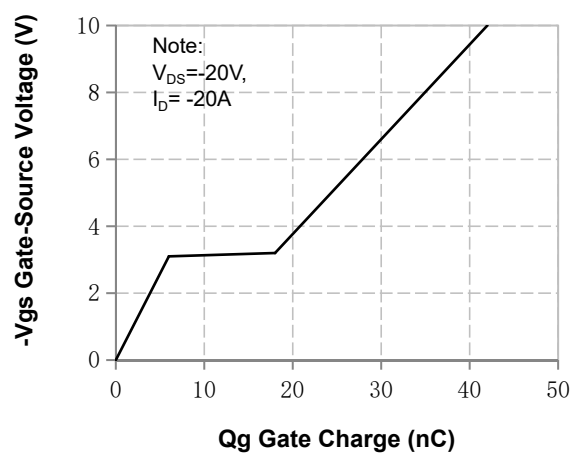
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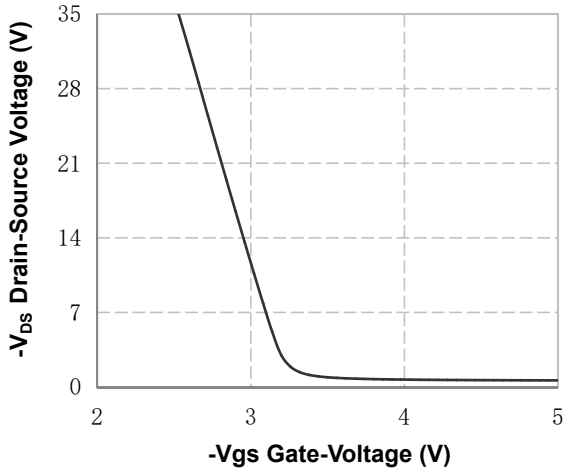
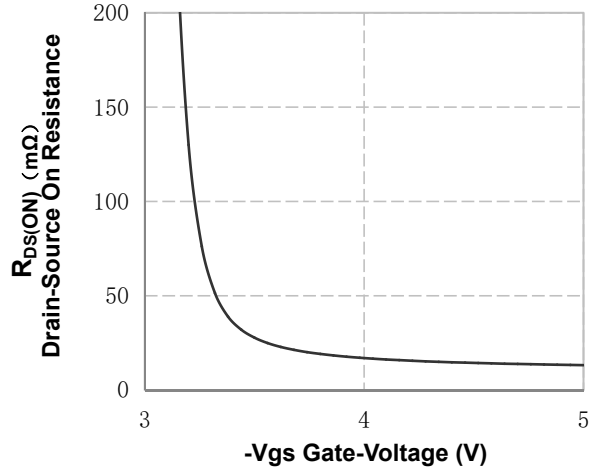
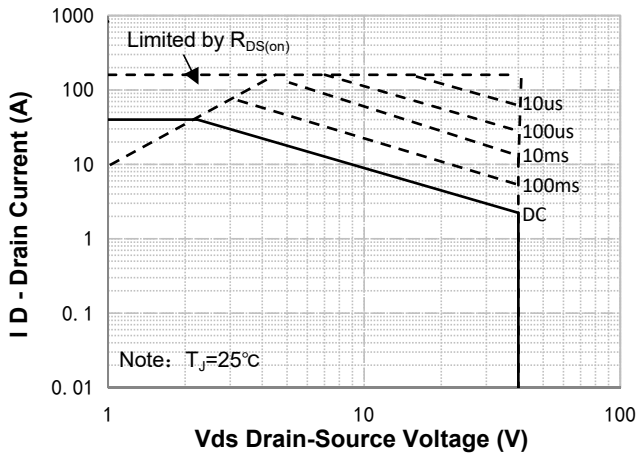
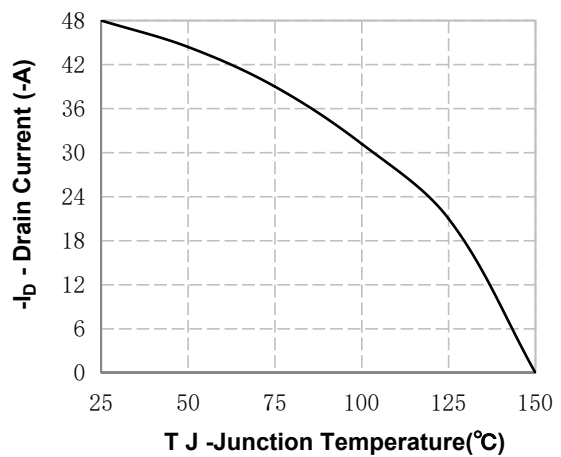
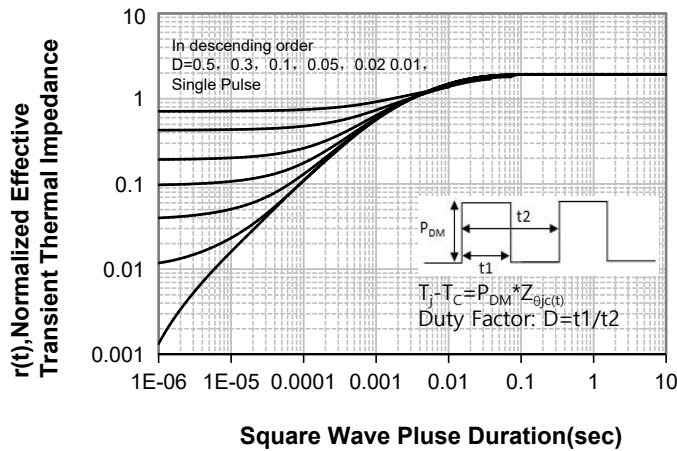
Electrical Characteristics ($T_J=25^{\circ}\text{C}$, Unless Otherwise Noted)

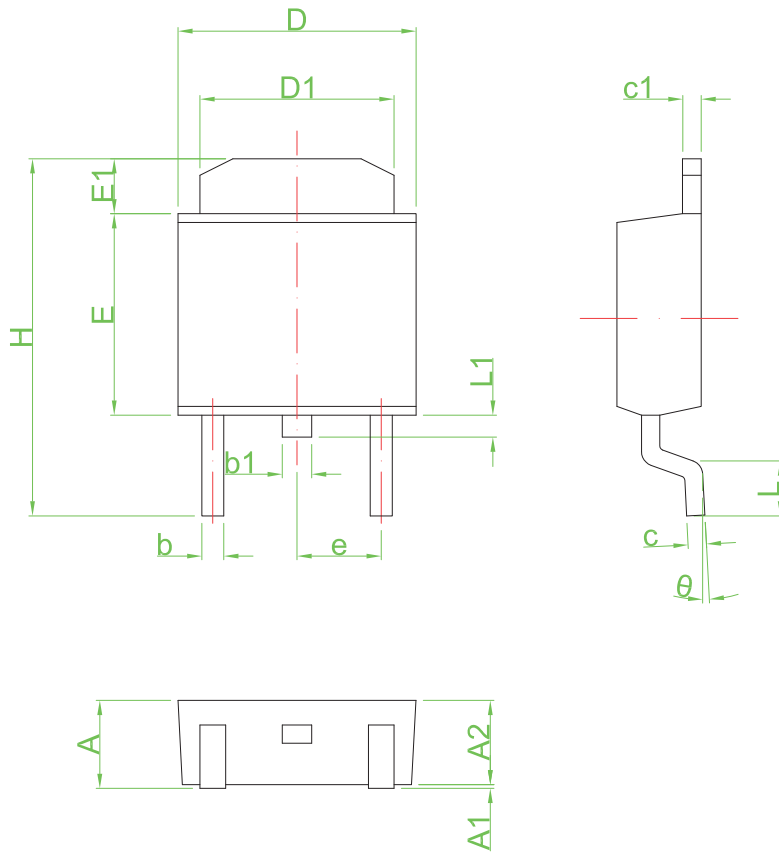
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Static Electrical Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-40	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-40V, V_{GS}=0V$	---	---	-1	μA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.2	---	-2.2	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
$R_{DS(on)}$	Drain-Source On-state Resistance	$V_{GS}=-10V, I_D=-20A$	---	11	14	m Ω
		$V_{GS}=-4.5V, I_D=-20A$	---	14	18	m Ω
Dynamic Characteristics^⑤						
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=-20V, \text{Freq.}=1\text{MHz}$	---	3120	---	pF
C_{oss}	Output Capacitance		---	238	---	
C_{rss}	Reverse Transfer Capacitance		---	226	---	
$T_{d(on)}$	Turn-on Delay Time	$V_{GS}=-10V, V_{DD}=-20V, I_D=-20A, R_G=3\Omega$	---	14	---	nS
T_r	Turn-on Rise Time		---	16	---	
$T_{d(off)}$	Turn-off Delay Time		---	36	---	
T_f	Turn-off Fall Time		---	38	---	
Q_g	Total Gate Charge	$V_{GS}=-10V, V_{DD}=-20V, I_D=-20A$	---	42	---	nC
Q_{gs}	Gate-Source Charge		---	7	---	
Q_{gd}	Gate-Drain Charge		---	8	---	
Source-Drain Characteristics						
$V_{SD}^{④}$	Diode Forward Voltage	$I_S=-20A, V_{GS}=0V$	---	---	-1.2	V

Note ④: Pulse test (pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$).

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

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Typical Characteristics

Figure 1. On-Region Characteristics

Figure 2. Transfer Characteristics

Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

Figure 5. Capacitance Characteristics

Figure 6. Gate Charge Characteristics

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Figure 7. V_{DS} Drain-Source Voltage vs Gate Voltage

Figure 8. On-Resistance vs Gate Voltage

Figure 9. Maximum Safe Operating Area

Figure 10. Maximum Continuous Drain Current vs Temperature

Figure 11. Transient Thermal Response Curve

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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°