

RoHS Compliant Product  
A suffix of "-C" specifies halogen & lead-free

## DESCRIPTION

The miniature surface mount MOSFETs utilize a high cell density trench process to provide Low  $R_{DS(on)}$  and to ensure minimal power loss and heat dissipation.

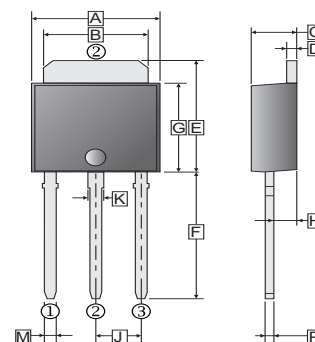
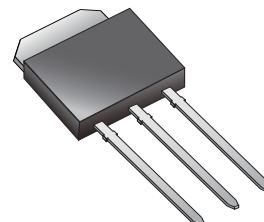
## FEATURES

- Low  $R_{DS(on)}$  provides higher efficiency and extends battery life.
- Miniature SC-59 surface mount package saves board space.
- Fast switching speed.
- High performance trench technology.

## APPLICATION

DC-DC converters, power management in portable and battery-powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones.

### TO-251P



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	6.40	6.80	G	6.00	6.30
B	5.20	5.50	H	0.90	1.50
C	2.20	2.40	J	2.30	
D	0.40	0.60	K	0.60	0.90
E	6.80	7.20	M	0.70	1.20
F	4.00		P	0.40	0.60

## ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>1</sup>	$I_D$	19	A
Pulsed Drain Current <sup>2</sup>	$I_{DM}$	40	A
Continuous Source Current (Diode Conduction) <sup>1</sup>	$I_S$	30	A
Power Dissipation <sup>1</sup>	$P_D$	50	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 ~ 175	$^\circ\text{C}$
Thermal Resistance Data			
Maximum Junction to Ambient <sup>1</sup>	$R_{\theta JA}$	50	$^\circ\text{C} / \text{W}$
Maximum Junction to Case	$R_{\theta JC}$	3	

Notes:

1. Surface Mounted on 1" x 1" FR4 Board.
2. Pulse width limited by maximum junction temperature.

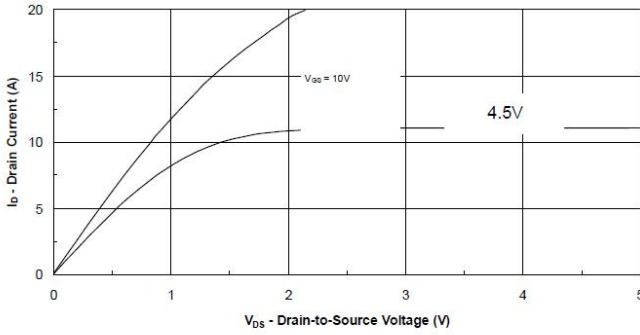
**ELECTRICAL CHARACTERISTICS** ( $T_A=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Min	Typ	Max	Unit	Test conditions
<b>Static</b>						
Gate-Threshold Voltage	$V_{GS(th)}$	1	-	-	V	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$
Gate-Body Leakage	$I_{GSS}$	-	-	$\pm 100$	nA	$V_{DS}=0$ , $V_{GS}=20\text{V}$
Zero Gate Voltage Drain Current	$I_{DSS}$	-	-	1	$\mu\text{A}$	$V_{DS}=48\text{V}$ , $V_{GS}=0$
		-	-	25		$V_{DS}=48\text{V}$ , $V_{GS}=0$ , $T_J=55^\circ\text{C}$
On-State Drain Current <sup>1</sup>	$I_{D(ON)}$	30	-	-	A	$V_{DS}=5\text{V}$ , $V_{GS}=10\text{V}$
Drain-Source On-Resistance <sup>1</sup>	$R_{DS(ON)}$	-	-	94	m $\Omega$	$V_{GS}=10\text{V}$ , $I_D=19\text{A}$
		-	-	109		$V_{GS}=4.5\text{V}$ , $I_D=18\text{A}$
Forward Transconductance <sup>1</sup>	$g_{FS}$	-	22	-	S	$V_{DS}=15\text{V}$ , $I_D=19\text{A}$
Diode Forward Voltage	$V_{SD}$	-	1.1	-	V	$I_S=24\text{A}$ , $V_{GS}=0$
<b>Dynamic <sup>2</sup></b>						
Total Gate Charge	$Q_g$	-	3.6	-	nC	$I_D=19\text{A}$ $V_{DS}=15\text{V}$ $V_{GS}=4.5\text{V}$
Gate-Source Charge	$Q_{gs}$	-	1.8	-		
Gate-Drain Charge	$Q_{gd}$	-	1.3	-		
Turn-On Delay Time	$T_{d(ON)}$	-	16	-	nS	$V_{DD}=25\text{V}$ $V_{GEN}=10\text{V}$ $R_L=25\Omega$ $I_D=24\text{A}$
Rise Time	$T_r$	-	5	-		
Turn-Off Delay Time	$T_{d(OFF)}$	-	23	-		
Fall Time	$T_f$	-	3	-		
Source-Drain Reverse Recovery Time	$T_{rr}$	-	50	-	nS	$I_F=24\text{A}$ , $Di/Dt=100\text{A}/\mu\text{S}$

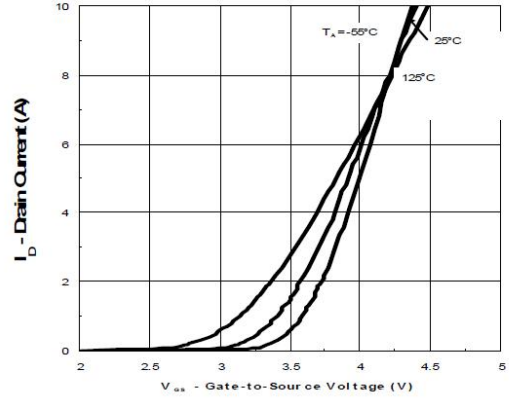
Notes:

- 1 Pulse test :  $PW \leq 300 \mu\text{s}$  duty cycle  $\leq 2\%$ .
- 2 Guaranteed by design, not subject to production testing.

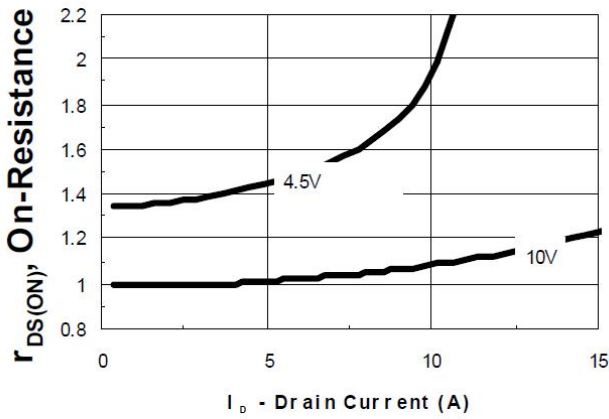
**CHARACTERISTIC CURVE**



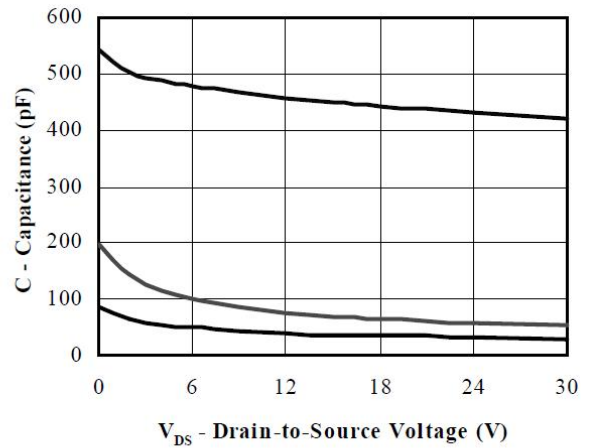
Output Characteristics



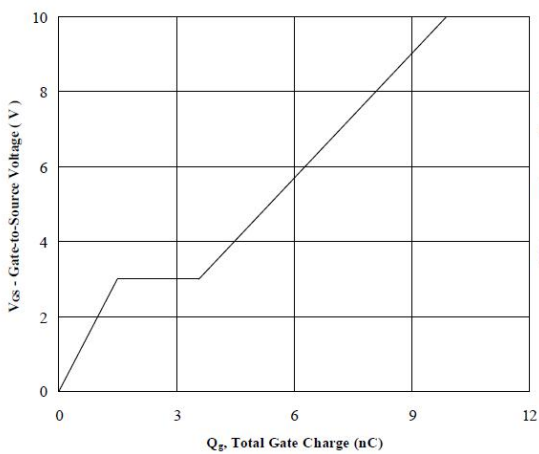
Transfer Characteristics



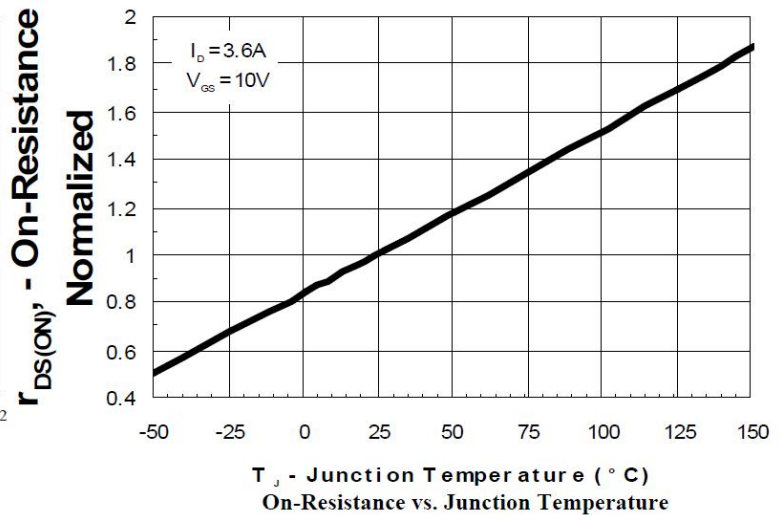
On-Resistance vs. Drain Current



Capacitance

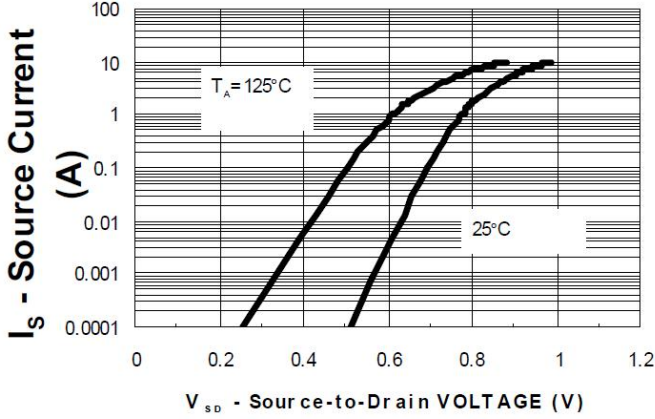


Gate Charge

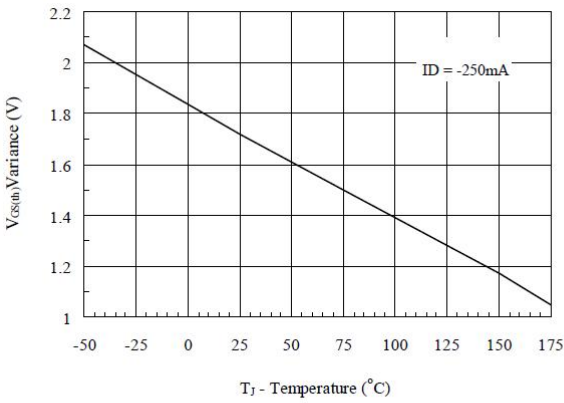


On-Resistance vs. Junction Temperature

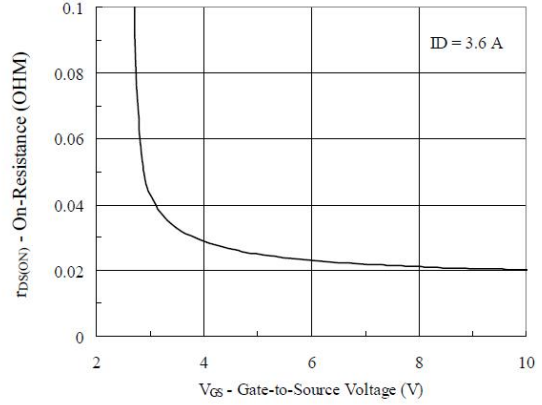
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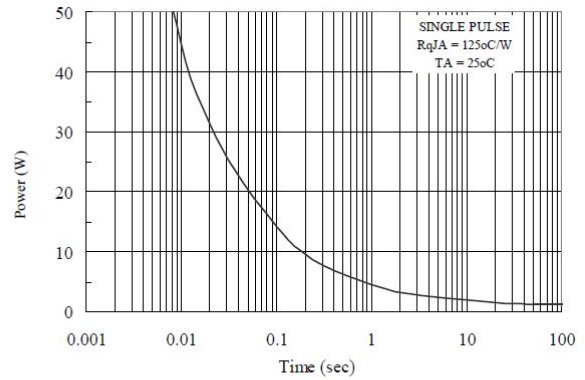
Source-Drain Diode Forward Voltage



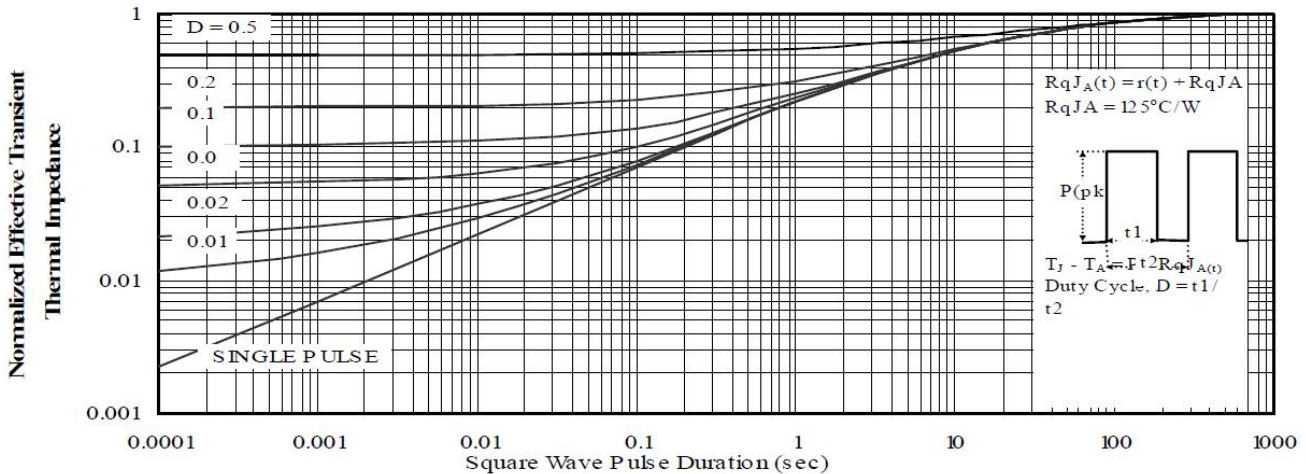
Threshold Voltage



On-Resistance vs. Gate-to-Source Voltage



Single Pulse Power



Normalized Thermal Transient Impedance, Junction-to-Ambient