

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

## DESCRIPTION

These miniature surface mount MOSFETs utilize high cell density process. Low  $R_{DS(on)}$  assures minimal power loss and conserves energy, making this device ideal for use in power management circuitry. Typical applications are PWMDC-DC converters, power management in portable and battery-powered products such as computers, printers, battery charger, telecommunication power system, and telephones power system.

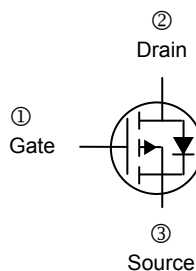
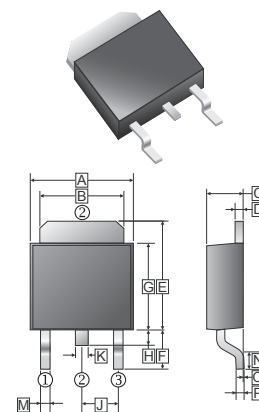
**TO-252(D-Pack)**

## FEATURES

- Low  $R_{DS(on)}$  provides higher efficiency and extends battery life.
- Miniature TO-252 surface mount package saves board space.
- High power and current handling capability.
- Extended  $V_{GS}$  range ( $\pm 25$ ) for battery pack applications.

## PRODUCT SUMMARY

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$V_{DS}(V)$	$R_{DS(on)}$ m( $\Omega$ )	$I_D(A)$
-60	49@ $V_{GS} = -10V$	28
	60@ $V_{GS} = -4.5V$	24



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	6.4	6.8	J	2.30	REF.
B	5.20	5.50	K	0.70	0.90
C	2.20	2.40	M	0.50	1.1
D	0.45	0.58	N	0.9	1.6
E	6.8	7.3	O	0	0.15
F	2.40	3.0	P	0.43	0.58
G	5.40	6.2			
H	0.8	1.20			

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

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	$V_{DS}$	-60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>a</sup>	$I_D @ T_A = 25^\circ C$	61	A
Pulsed Drain Current <sup>b</sup>	$I_{DM}$	$\pm 40$	A
Continuous Source Current (Diode Conduction) <sup>a</sup>	$I_S$	-30	A
Total Power Dissipation <sup>a</sup>	$P_D @ T_A = 25^\circ C$	50	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 ~ 175	$^\circ C$
THERMAL RESISTANCE RATINGS			
Maximum Thermal Resistance Junction-Ambient <sup>a</sup>	$R_{\theta JA}$	50	$^\circ C / W$
Maximum Thermal Resistance Junction-Case	$R_{\theta JC}$	3.0	$^\circ C / W$

Notes :

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

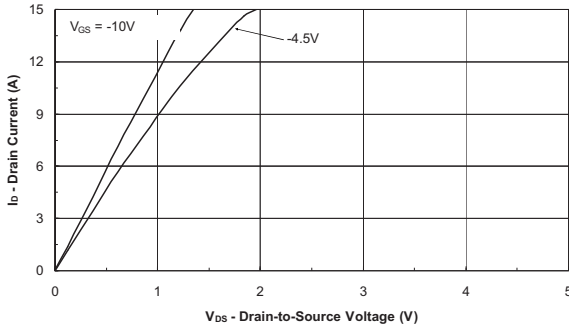
**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise specified)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
<b>Static</b>						
Gate-Threshold Voltage	$V_{GS(th)}$	-1	-	-		$V_{DS} = V_{GS}, I_D = -250 \mu\text{A}$
Gate-Body Leakage	$I_{GSS}$	-	-	$\pm 100$	nA	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$
Zero Gate Voltage Drain Current	$I_{DSS}$	-	-	-1	$\mu\text{A}$	$V_{DS} = -48\text{V}, V_{GS} = 0\text{V}$
		-	-	-10		$V_{DS} = -48\text{V}, V_{GS} = 0\text{V}, T_J = 55^\circ\text{C}$
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	-20	-	-	A	$V_{DS} = -5\text{V}, V_{GS} = -10\text{V}$
Drain-Source On-Resistance <sup>a</sup>	$R_{DS(ON)}$	-	-	49	m $\Omega$	$V_{GS} = -10\text{V}, I_D = -28\text{A}$
		-	-	60		$V_{GS} = -4.5\text{V}, I_D = -24\text{A}$
Forward Transconductance <sup>a</sup>	$g_{fs}$	-	8	-	S	$V_{DS} = -15\text{V}, I_D = -28\text{A}$
Diode Forward Voltage	$V_{SD}$	-	-	-1.2	V	$I_S = -2.5\text{A}, V_{GS} = 0\text{V}$
<b>Dynamic <sup>b</sup></b>						
Total Gate Charge	$Q_g$	-	18	-	nC	$V_{DS} = -30\text{V}$ $V_{GS} = -4.5\text{V}$ $I_D = -28\text{A}$
Gate-Source Charge	$Q_{gs}$	-	5	-		
Gate-Drain Charge	$Q_{gd}$	-	2	-		
Turn-on Delay Time	$T_{d(on)}$	-	8	-	nS	$V_{DD} = -30\text{V}$ $I_D = -1\text{A}$ $V_{GEN} = -10\text{V}$ $R_L = 30\ \Omega$ $R_G = 6\ \Omega$
Rise Time	$T_r$	-	10	-		
Turn-off Delay Time	$T_{d(off)}$	-	35	-		
Fall Time	$T_f$	-	12	-		

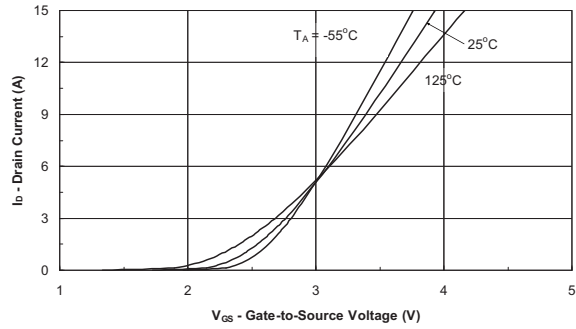
Notes

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

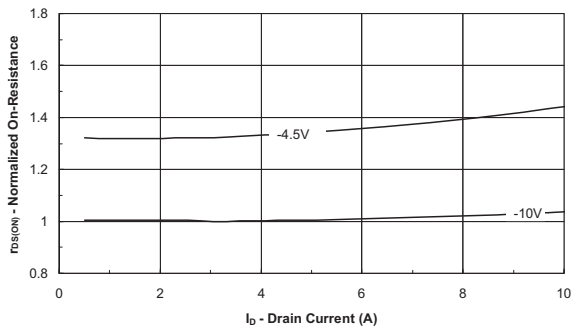
**CHARACTERISTIC CURVE**



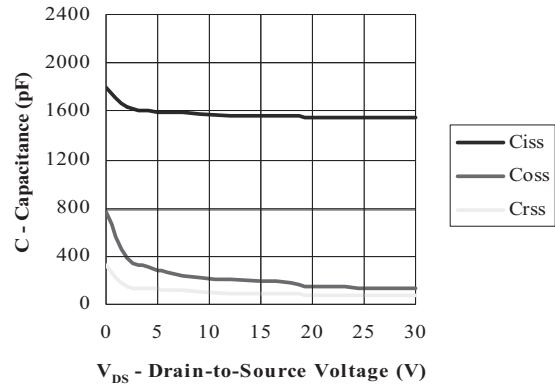
**Output Characteristics**



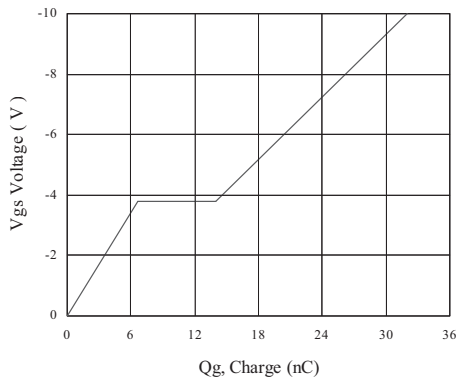
**Transfer Characteristics**



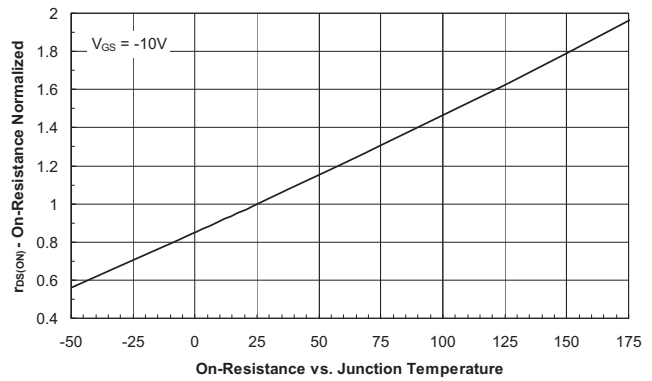
**On-Resistance vs. Drain Current**



**Capacitance**

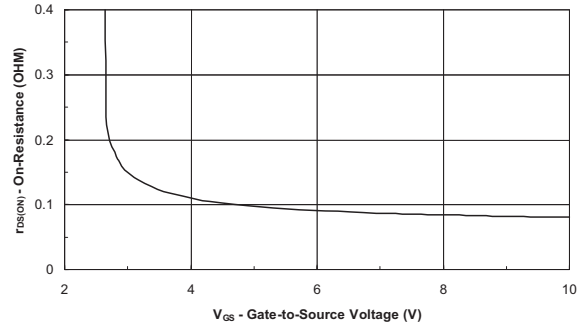
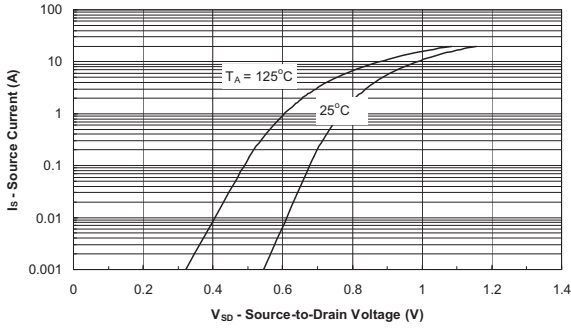


**Gate Charge**

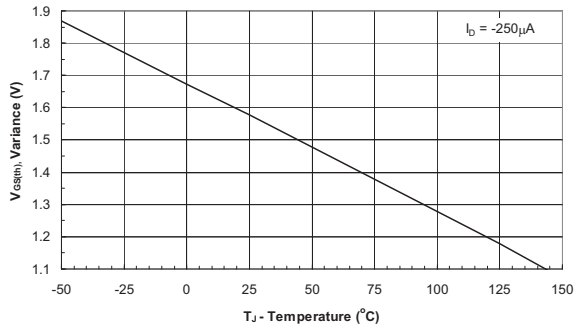


**On-Resistance vs. Junction Temperature**

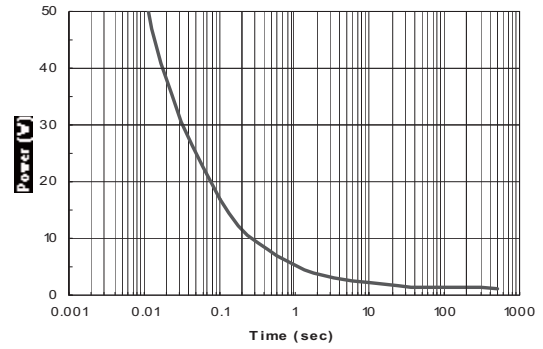
**CHARACTERISTIC CURVE**



**Source-Drain Diode Forward Voltage**

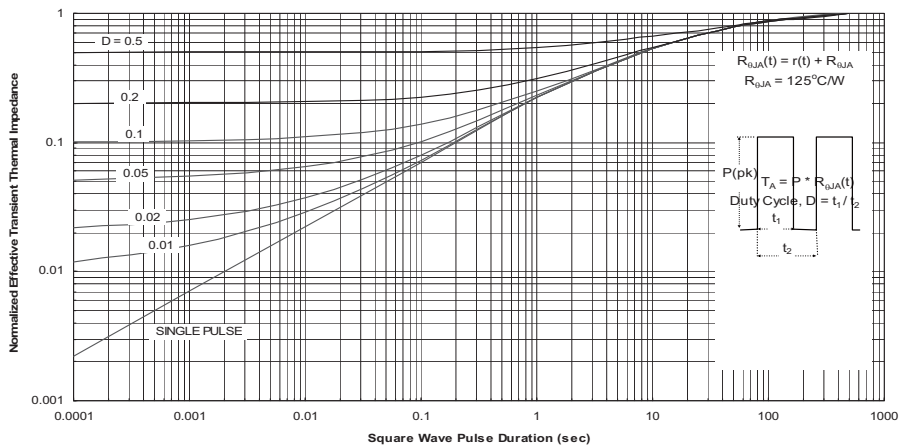


**On-Resistance vs. Gate-to Source Voltage**



**Threshold Voltage**

**Single Pulse Power**



**Normalized Thermal Transient Impedance, Junction-to-Ambient**