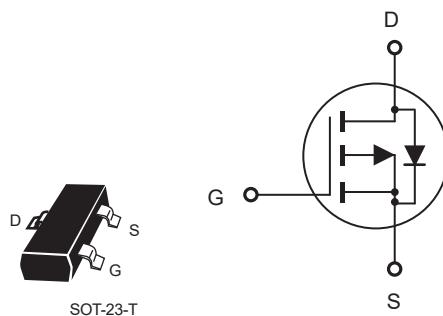


## P-Channel Enhancement Mode Field Effect Transistor

### FEATURES

- -20V, -3.2A,  $R_{DS(ON)} = 78m\Omega$  @ $V_{GS} = -4.5V$ .
- $R_{DS(ON)} = 110m\Omega$  @ $V_{GS} = -2.5V$ .
- $R_{DS(ON)} = 150m\Omega$  @ $V_{GS} = -1.8V$ .
- High dense cell design for extremely low  $R_{DS(ON)}$ .
- Rugged and reliable.
- RoHS compliant.
- SOT-23-T package.



### ABSOLUTE MAXIMUM RATINGS

$T_A = 25^\circ C$  unless otherwise noted

Parameter	Symbol	Limit	Units
Drain-Source Voltage	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Drain Current-Continuous	$I_D$	-3.2	A
Drain Current-Pulsed <sup>a</sup>	$I_{DM}$	-12.8	A
Maximum Power Dissipation	$P_D$	1.25	W
Operating and Store Temperature Range	$T_J, T_{stg}$	-55 to 150	°C

### Thermal Characteristics

Parameter	Symbol	Limit	Units
Thermal Resistance, Junction-to-Ambient <sup>b</sup>	$R_{\theta JA}$	100	°C/W



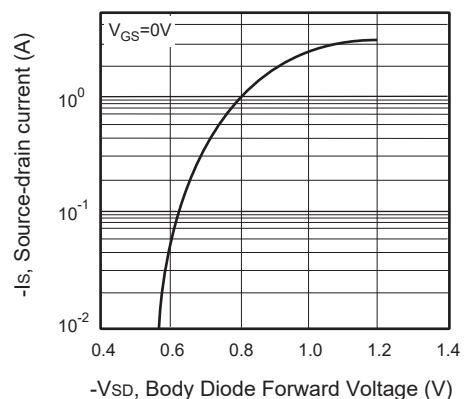
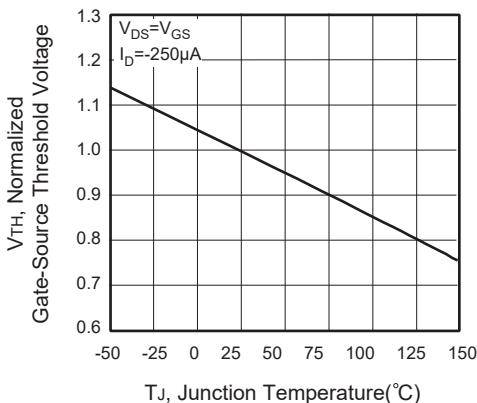
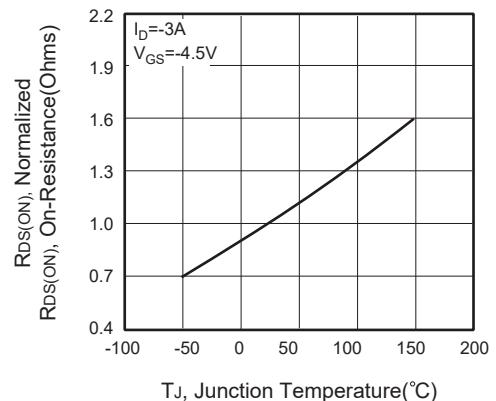
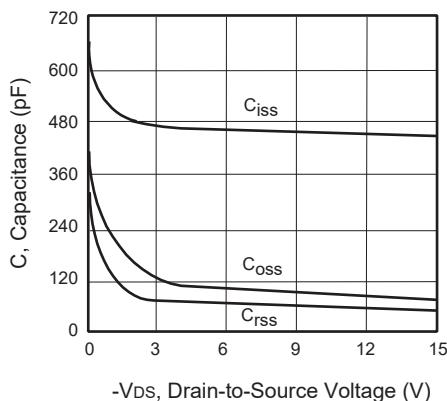
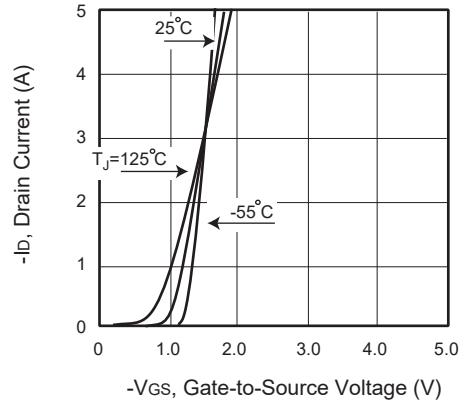
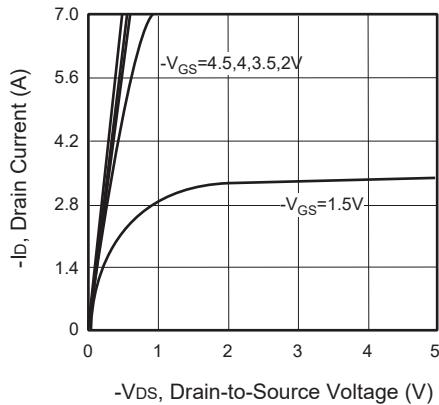
# CEN2333

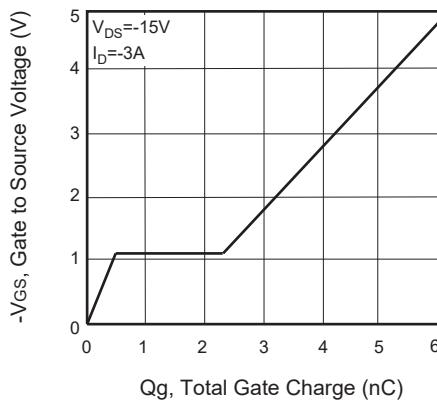
## Electrical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$\text{BV}_{\text{DSS}}$	$V_{\text{GS}} = 0\text{V}, I_D = -250\mu\text{A}$	-20			V
Zero Gate Voltage Drain Current	$I_{\text{DSS}}$	$V_{\text{DS}} = -20\text{V}, V_{\text{GS}} = 0\text{V}$			-1	$\mu\text{A}$
Gate Body Leakage Current, Forward	$I_{\text{GSSF}}$	$V_{\text{GS}} = 12\text{V}, V_{\text{DS}} = 0\text{V}$			100	nA
Gate Body Leakage Current, Reverse	$I_{\text{GSSR}}$	$V_{\text{GS}} = -12\text{V}, V_{\text{DS}} = 0\text{V}$			-100	nA
<b>On Characteristics<sup>c</sup></b>						
Gate Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{GS}} = V_{\text{DS}}, I_D = -250\mu\text{A}$	-0.4		-1	V
Static Drain-Source On-Resistance	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = -4.5\text{V}, I_D = -3\text{A}$		65	78	$\text{m}\Omega$
		$V_{\text{GS}} = -2.5\text{V}, I_D = -2\text{A}$		85	110	$\text{m}\Omega$
		$V_{\text{GS}} = -1.8\text{V}, I_D = -1\text{A}$		112	150	$\text{m}\Omega$
<b>Dynamic Characteristics<sup>d</sup></b>						
Input Capacitance	$C_{\text{iss}}$	$V_{\text{DS}} = -15\text{V}, V_{\text{GS}} = 0\text{V}, f = 1.0 \text{ MHz}$		435		pF
Output Capacitance	$C_{\text{oss}}$			70		pF
Reverse Transfer Capacitance	$C_{\text{rss}}$			55		pF
<b>Switching Characteristics<sup>d</sup></b>						
Turn-On Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{DD}} = -15\text{V}, I_D = -1\text{A}, V_{\text{GS}} = -4.5\text{V}, R_{\text{GEN}} = 10\Omega$		10		ns
Turn-On Rise Time	$t_r$			8		ns
Turn-Off Delay Time	$t_{\text{d}(\text{off})}$			42		ns
Turn-Off Fall Time	$t_f$			14		ns
Total Gate Charge	$Q_g$	$V_{\text{DS}} = -15\text{V}, I_D = -3\text{A}, V_{\text{GS}} = -4.5\text{V}$		5.8		nC
Gate-Source Charge	$Q_{\text{gs}}$			0.5		nC
Gate-Drain Charge	$Q_{\text{gd}}$			1.8		nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Drain-Source Diode Forward Current <sup>b</sup>	$I_S$				-1	A
Drain-Source Diode Forward Voltage <sup>c</sup>	$V_{\text{SD}}$	$V_{\text{GS}} = 0\text{V}, I_S = -1\text{A}$			-1.2	V

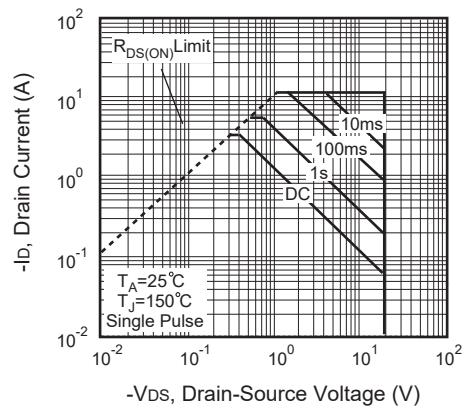
Notes :

- a.Repetitive Rating : Pulse width limited by maximum junction temperature.
- b.Surface Mounted on FR4 Board,  $t < 5 \text{ sec}$ .
- c.Pulse Test : Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .
- d.Guaranteed by design, not subject to production testing.

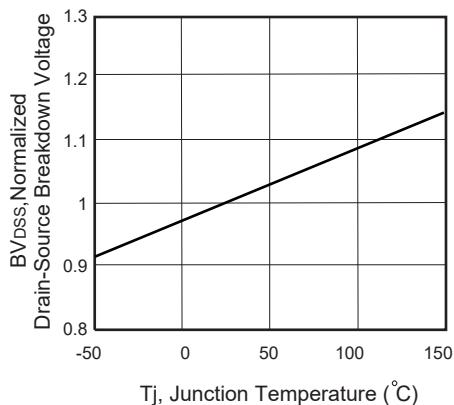




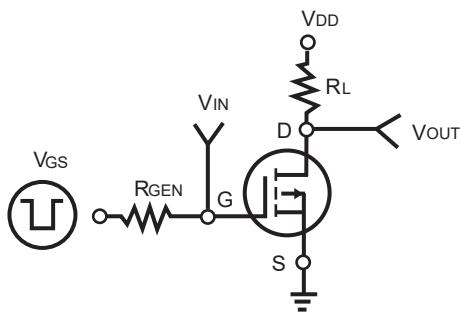
**Figure 7. Gate Charge**



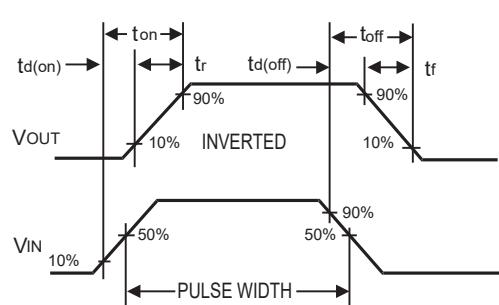
**Figure 8. Maximum Safe Operating Area**



**Figure 9. Breakdown Voltage Variation VS Temperature**



**Figure 10. Switching Test Circuit**



**Figure 11. Switching Waveforms**

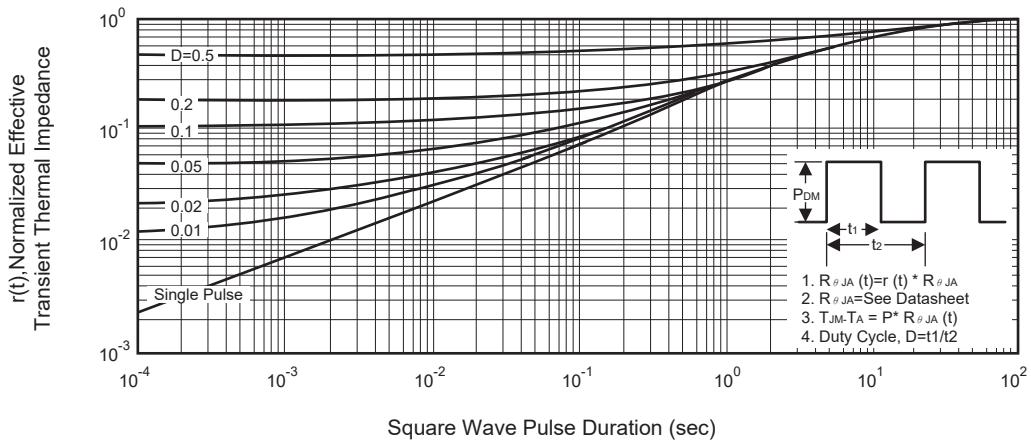


Figure 12. Normalized Thermal Transient Impedance Curve